Gatwick Airport Limited (GAL) Redesign of Departure and Arrival Routes and Procedures (FASI-S ACP)

CAA ACP ID: ACP-2018-60

Stage 2 Annex A: Evolution of the Options Design

1. Event B. Round 1 Engagement Presentation Slides (Q3 2021)
2. Event E. December 2021 Briefing Slides (Q4 2021)
3. Event F. Round 2 Engagement CLOO Presentation Slides (Q1 2022)
4. Event G. Round 3 DPE Presentation Slides (Q2 2022)
5. Event I. Round 3 IOA Presentation Slides (Q1 2023)
6. Event J. Round 3 IOA Outcomes Presentation Slides (Q3 2023)

LONDON GATWICK

POWERED BY VINCI AIRPORTS | GLOBAL INFRASTRUCTURE PARTNERS

YOUR LONDON AIRPORT
Gatwick

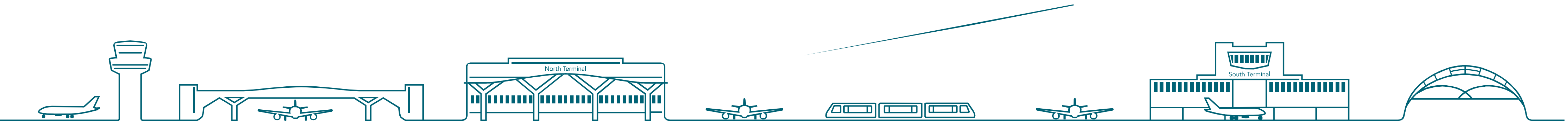
Gatwick Airport FASI South Airspace Change Proposal

Stakeholder briefing on the methodology for developing and assessing airspace change design options during Stage 2 of the CAP1616 process

Virtual Workshop Session

September 2nd / 3rd 2021

Version 3.0



1. WELCOME & INTRODUCTIONS

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

Presenters for today's briefing

- Goran Jovanovic – Airspace Change Manager, Gatwick Airport Limited
- Chris Barnes – Director, Trax International Limited
- Dave Jones – Head of Airspace and Procedure Design, Trax International Limited

1. WELCOME & INTRODUCTIONS: AGENDA, SEPTEMBER 3RD 10.00 - 12.00

1. Welcome and Introductions	10 minutes
2. Methodology Objectives and Overview	10 minutes
3. Developing an Airspace Design Database	15 minutes
4. Defining the Do-Nothing Scenario	10 minutes
5. Building a Comprehensive List of Options	15 minutes
6. Conducting the Design Principle Evaluation	10 minutes
7. Producing the Initial Options Appraisal	10 minutes
8. Methodology for the Full Options Appraisal	5 minutes
9. Discussion and Feedback	30 minutes
10. Next steps and close	5 minutes

1. WELCOME & INTRODUCTIONS: DISCUSSION AND FEEDBACK

- The slides will be circulated following the meeting along with a record of the key points raised by participants and all questions and answers.
- We will pause regularly during the presentation to take feedback and questions.
- Please raise your virtual hand using the functionality in MS Teams if you would like to make a contribution, rather than putting questions in the chat.

Thank you.

2. METHODOLOGY OBJECTIVES AND OVERVIEW: BACKGROUND

The UK's Airspace Modernisation Strategy identifies the need to fundamentally redesign the airspace in Southern England to meet the demand for air transport in a sustainable and resilient way.

- The airspace redesign in Southern England is being delivered as a single coordinated programme known as FASI (Future Airspace Strategy Implementation) South.
- The DfT asked all affected airports, and NATS, to develop ACPs as part of the programme.
- The interdependencies between ACPs must be coordinated to optimise the overall design as part of an Airspace Masterplan.
- Our methodology to develop and assess options must align with the wider FASI programme and generate the information required for the Masterplan.

2. METHODOLOGY OBJECTIVES AND OVERVIEW: CAP1616 PROCESS REQUIREMENTS

This briefing describes the methodology that we intend to follow to develop and assess options for the FASI South ACP.

The methodology addresses the requirements laid out in Stage 2 of CAP1616

Step 2A: Develop a first Comprehensive List of Options and evaluate them against the Design Principles to narrow down to a shortlist.

Step 2B: Conduct an Initial Appraisal of the options on the shortlist.

The Initial Options Appraisal is the 1 of 3 phases of appraisal required to refine the options and introduce progressively more detail to the analysis of costs and benefits:

Stage 2: Develop and Assess

Initial Options Appraisal
Largely qualitative assessment of the shortlisted options to highlight the relative impacts, both positive and negative

Stage 3: Consult

Full Options Appraisal
A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms where possible

Stage 4: Update and Submit

Final Options Appraisal
The full appraisal updated and refined based on the output of the Stage 3 formal consultation with stakeholders

2. METHODOLOGY OBJECTIVES AND OVERVIEW: METHODOLOGY OBJECTIVES

The objective is for all options to be developed and assessed in a consistent, repeatable, objective & transparent manner.

The Stage 2 options development and assessment methodology aims to:

- Adequately consider, in a consistent manner, all viable options.
- Enable the CAA to re-run aspects of the appraisal to validate the outputs.
- Demonstrate clear objectivity in the option assessment process.
- Enable stakeholders and the public to understand the rationale behind our assessment.

2. METHODOLOGY OBJECTIVES AND OVERVIEW: STAGE 2 STAKEHOLDER ENGAGMENT

Stakeholders will be invited to participate in three rounds of engagement to help develop and assess options for the ACP.

Round 1: September 2021

Methodology Briefing

Engagement to gather feedback on the methodology that we intend to follow to develop and assess airspace change design options during Stage 2.

Round 2: December 2021

Options Briefing

Engagement to gather feedback on the development of a first Comprehensive List of Options for the ACP and the approach to the Design Principle Evaluation.

Round 3: April / May 2022

Appraisal Briefing

Engagement to present the outputs of the Initial Options Appraisal and gather feedback on how we should refine the appraisal and consult on the options during Stage 3.

2. METHODOLOGY OBJECTIVES AND OVERVIEW: SUMMARY

Our methodology is organised into six parts that address the CAP1616 requirements and development of the Masterplan.

1	**Develop an Airspace Design Database**	Define sections of airspace where a flight path could conceivably be positioned within the scope of the ACP.
2	**Define Do Nothing and Do Minimum Options**	Describe the Do-Nothing Scenario as a baseline and a ‘Do Minimum’ option if the ‘Do Nothing’ is not viable.
3	**Build the Comprehensive List of Options**	Set out all viable options that address the scope of the ACP as described in the Statement of Need.
4	**Conduct the Design Principle Evaluation**	Examine how well each option aligns with the Design Principles and shortlist the options to progress to the Initial Options Appraisal.
5	**Produce the Initial Options Appraisal**	Conduct a largely qualitative assessment of the impacts, both positive and negative, of the shortlisted options.
6	**Set out the Full Options Appraisal Methodology**	Describe the methodology for producing a quantitative appraisal with monetized costs and benefits in Stage 3.

YOUR LONDON AIRPORT Gatwick

QUESTIONS

3. DEVELOP AN AIRSPACE DESIGN DATABASE

The Airspace Design Database collates a core set of information needed to clearly demonstrate how each option has been identified and why the first list is considered sufficiently comprehensive.

Sections of Airspace

The database will cover all geographical sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.

Notional Flight Paths

We will define the broad range of notional flight paths that are technically possible within each section of airspace – an approach known as flooding.

Preliminary Assessment

A core set of information will be produced through a preliminary assessment of the performance of each individual notional flight path using a variety of noise and overflight measurements.

3. DEVELOP AN AIRSPACE DESIGN DATABASE: WORKING EXAMPLE - DEPARTURES

The following is an illustrative example of the steps required to develop an Airspace Design Database.

The worked example covers:

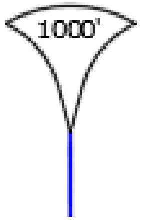
- How we'll construct the sections of airspace used for assessment
- How we'll populate the sections with notional flight paths
- How we'll conduct a preliminary assessment of the notional flight paths
- How we'll use this information to build a Comprehensive List of Options

Constructing the sections of airspace

- We now need to determine the sections of airspace in which an aircraft can depart and their expected altitudes along any given route.
- We will **use a fictious** Runway for an example.

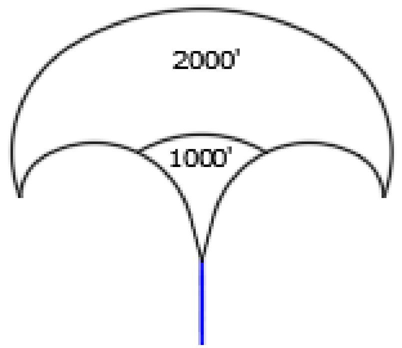
0 – 1000ft

- Regulatory airspace design criteria allows us to design a departure route which initiates a turn of up to 15° from the departure end of Runway.
- We will construct the limit based on a continuous 6% climb gradient.



0 – 2000ft

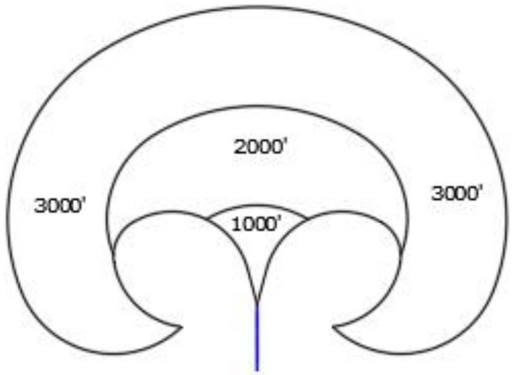
- The inside splays are now determined by minimum allowable turn.
- 6% climb gradient is continued to create the 2000ft band.



YOUR LONDON AIRPORT Gatwick

0 – 3000ft

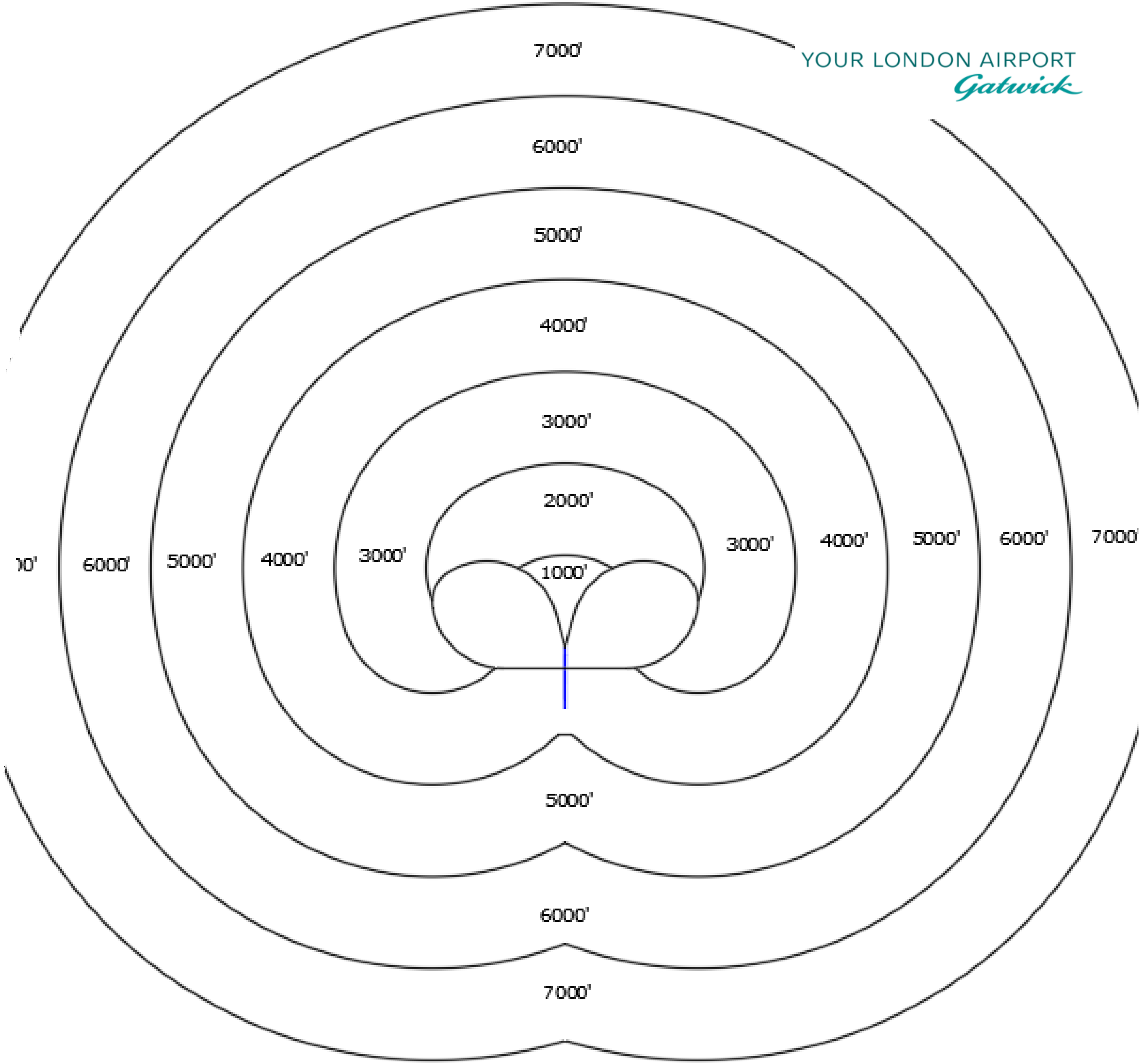
- It is now simply a case of building up the altitude bands to construct the rest of our section of airspace – continuing the 6% climb gradient.



YOUR LONDON AIRPORT Gatwick

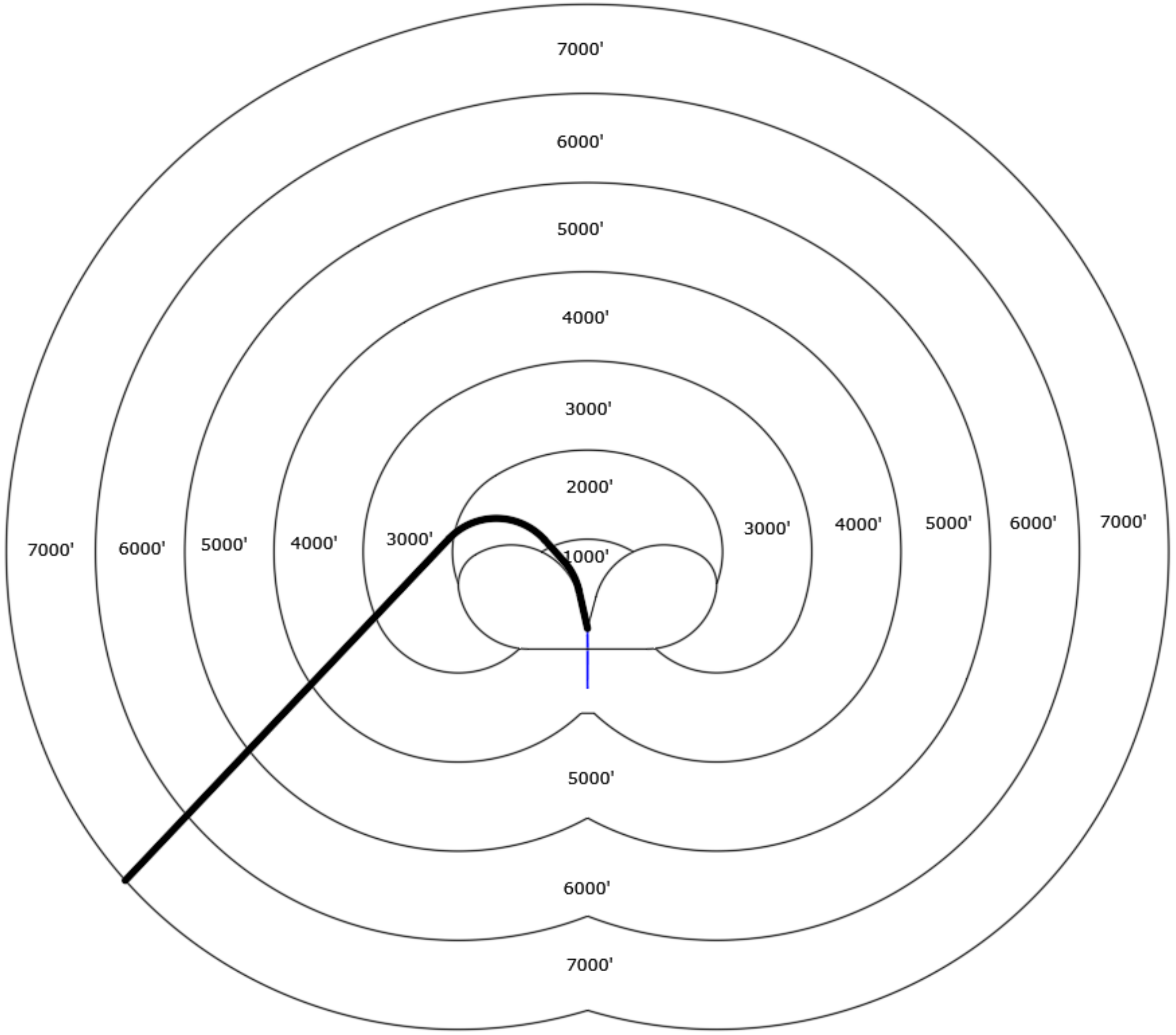
0 – 7000ft

- The possible areas that a departure could now end up has now been completed.
- A departure could end up in any part of this design area.



YOUR LONDON AIRPORT Gatwick

Flooding the newly constructed section of airspace

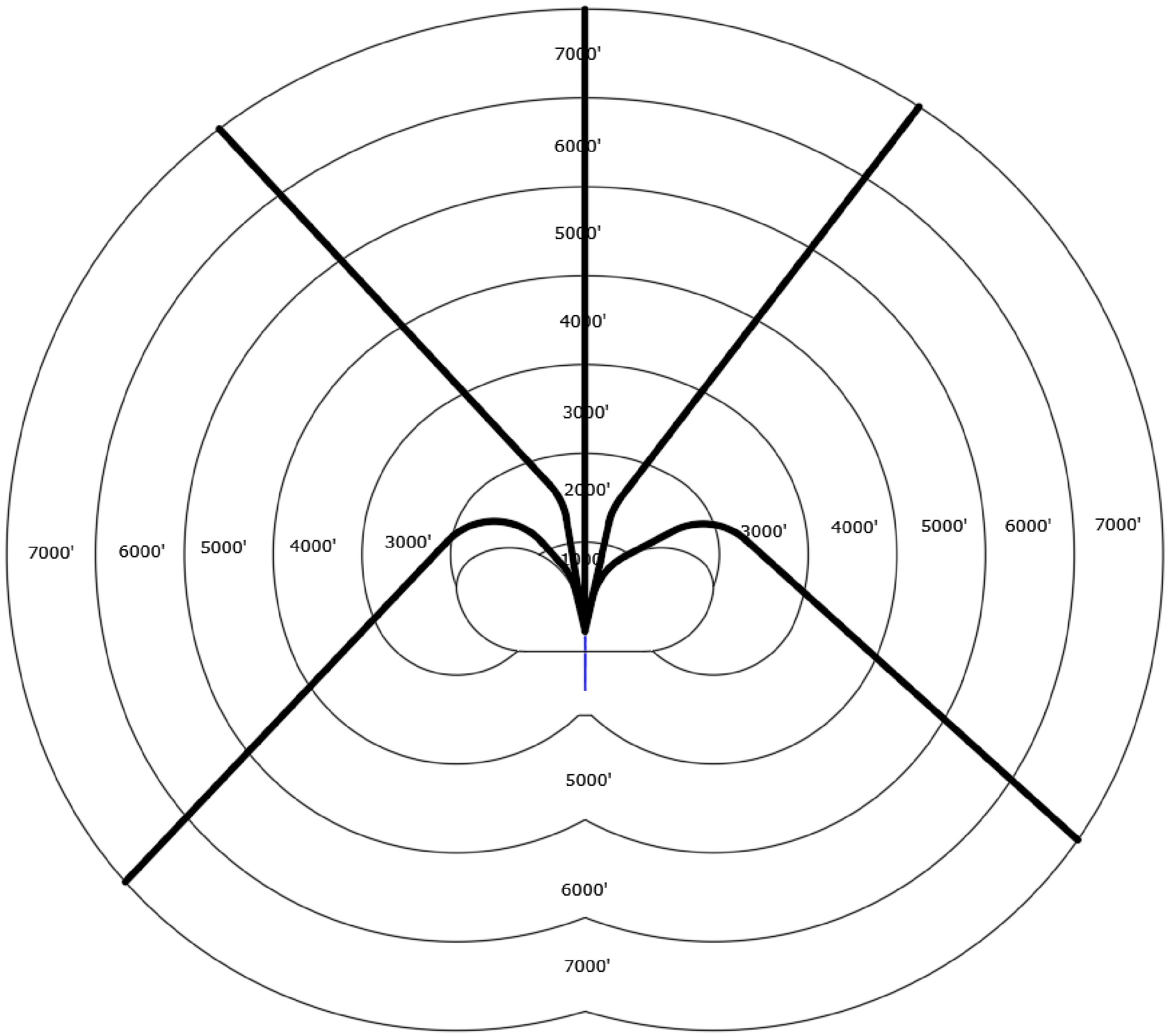


We now simply add a series of compliant notional flight paths to our completed sections to fill the Airspace Design Database.

YOUR LONDON AIRPORT
Gatwick

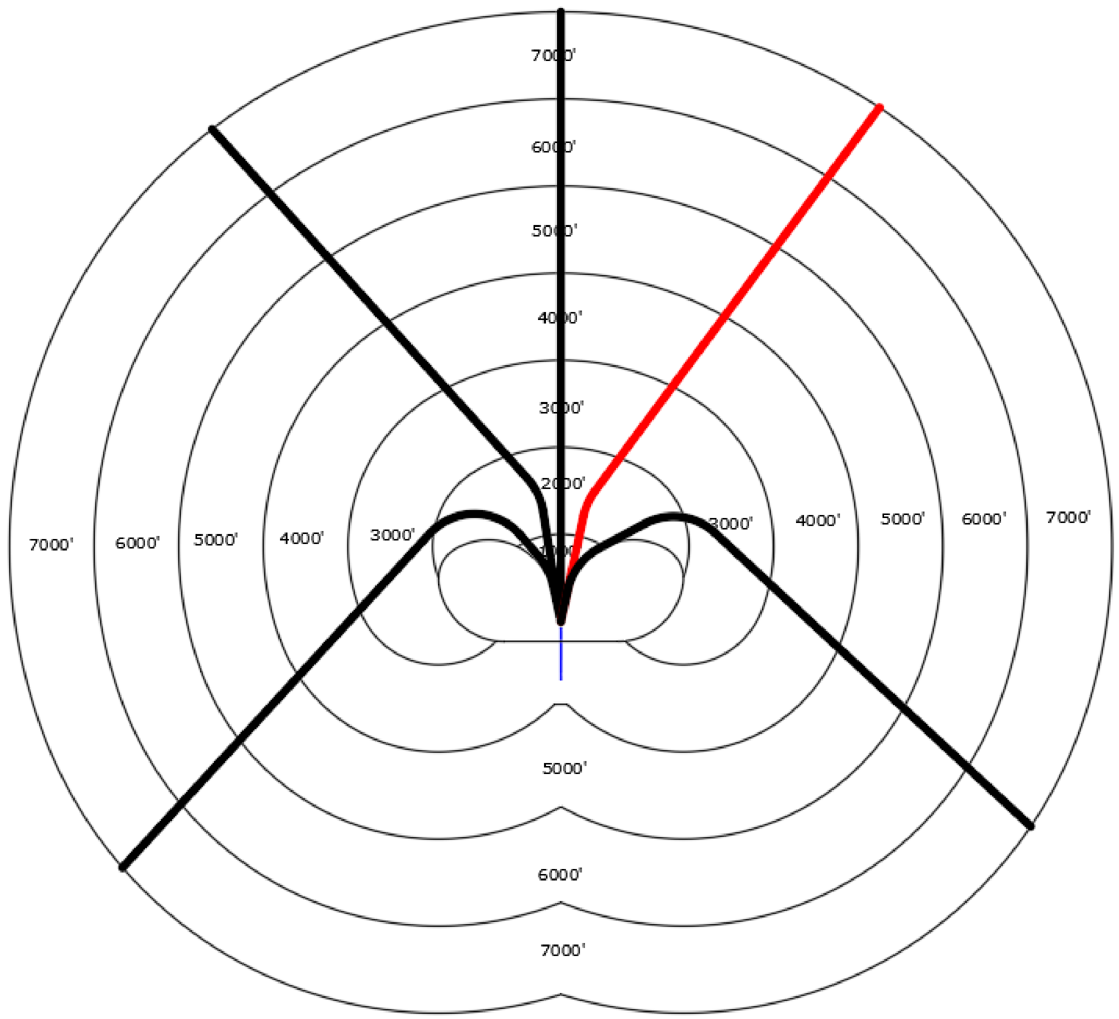
Building up the notional flight paths

- Is this example highlight 5 of the several thousand notional flight paths within this section.
- All of which will be fully compliant with regulatory airspace design criteria.



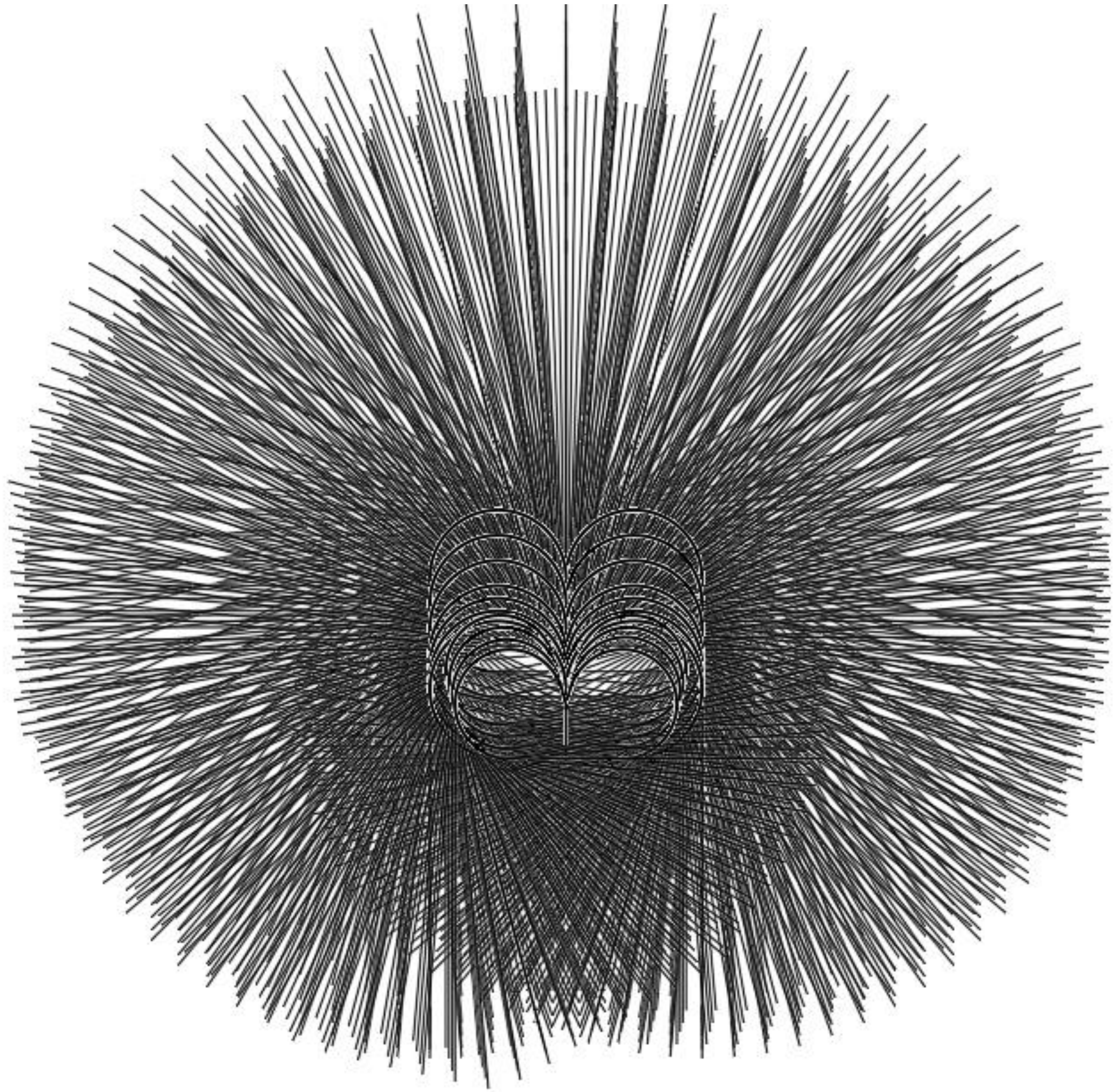
Full assessment

- All the notional flight paths will be subject to a preliminary assessment by the environmental team to determine which perform better against a series of factors including total amount of people overflown, newly overflown and Areas of Outstanding Natural Beauty (AONBs)
- In this example, the flight path in red is assumed to perform best in the preliminary assessment and may be one that is used in as part of an airspace design option.



Fully flooded area - Departure

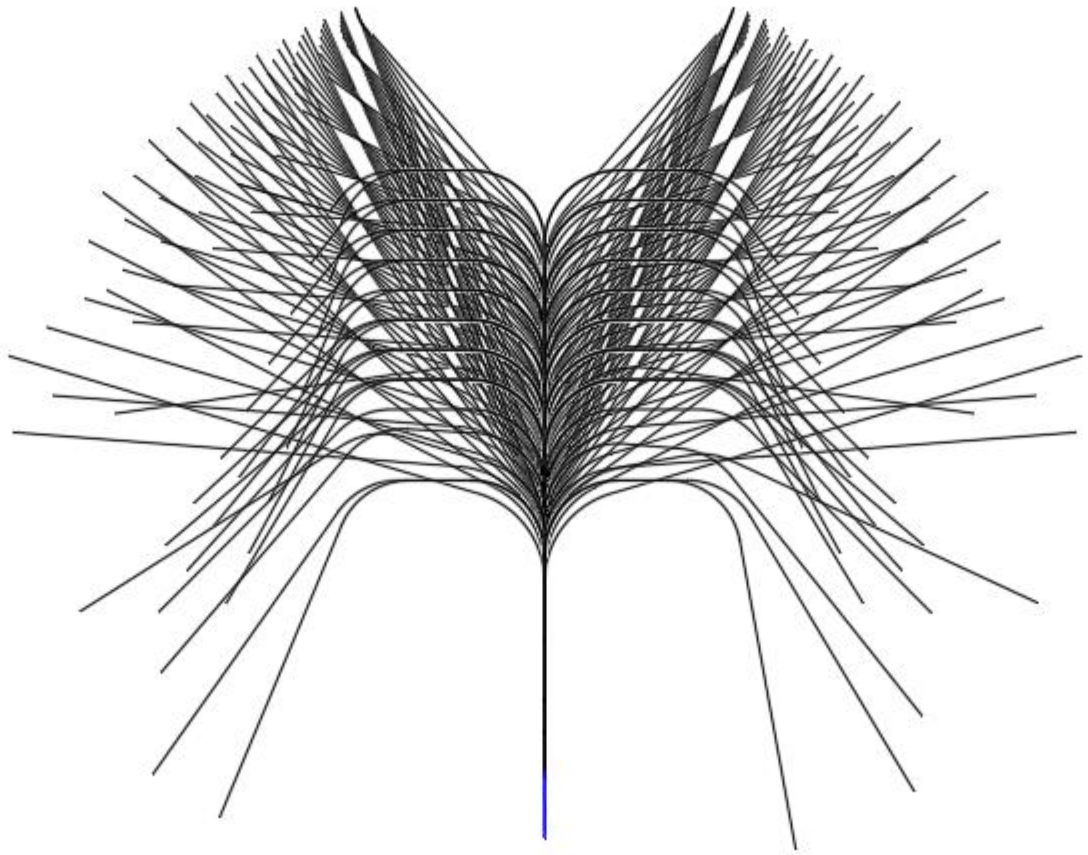
- This example shows a fully flooded area.
- It includes thousands of notional flight paths, each of which would go through the initial assessment described previously.
- This initial assessment will help us form a series of systems and form the long list.



YOUR LONDON AIRPORT Gatwick

Fully flooded area - Approach

- This example shows a fully flooded area.
- It includes hundreds of notional flight paths, each of which would go through the initial assessment described previously.
- This initial assessment will help us form a series of systems and form the long list.



QUESTIONS

2. DEFINE THE DO NOTHING AND DO MINIMUM OPTIONS

A Do Nothing option is the baseline that will be used to compare all other options against, illustrating the differences between the pre-implementation and post implementation scenarios over time.

- The Do Nothing scenario reflects the current airspace design for all arrival and departure routes and the prevailing air traffic situation with typical summer traffic levels.
- Factors that may affect the baseline in future years will be included in the scenario, e.g. traffic growth, fleet changes, housing developments & the Northern Runway Project.
- In the context of the FASI-S ACP, the Do Nothing scenario is theoretical – doing nothing is not a viable option for the reasons set out in the UK Airspace Modernisation Strategy.
- A Do Minimum option will also be produced that sets out the minimum level of change necessary and assesses the impacts in relation to current (Do Nothing) circumstances.

3. BUILD THE COMPREHENSIVE LIST OF OPTIONS (1)

We will create options to add to the Comprehensive List using the core set of information about sections of airspace and notional flight paths included in the Airspace Design Database from part 1.

- Each option will include a unique combination of the notional flight paths for arrivals and departures that can be deployed together as a technically feasible system.
- We must demonstrate how each option addresses the scope of the ACP outlined in the issues and opportunities section of the Statement of Need.
- The options should be aligned to the Design Principles, compliant with relevant technical criteria and compatible with the other interdependent FASI-South ACPs.
- We will continue to build options using the Airspace Design Database until each new system becomes indistinguishable from another option that has already been created.

3. BUILD THE COMPREHENSIVE LIST OF OPTIONS (2)

We will create options to add to the Comprehensive List using the core set of information about sections of airspace and notional flight paths included in the Airspace Design Database from part 1.

- The list of options is considered comprehensive when no new combination of flight paths creates a system of arrivals and departures that is materially different to one of its peers.
- Each option will be presented with a narrative description, accompanying illustration and an indicator of the likely noise impacts and other high-level costs and benefits.
- We will present the options during the next round of engagement in December 2021 to gather feedback and ensure that stakeholders are satisfied that the list is comprehensive, and the options developed are aligned with the Design Principles.

4. CONDUCT THE DESIGN PRINCIPLE EVALUATION

The Design Principle Evaluation examines how well each option on the Comprehensive List meets the Design Principles defined in Stage 1, with the object of narrowing down the list.

- The evaluation is a high-level exercise that applies a general set of criteria drawn from the Design Principles to each option in 2 steps:

  1. A qualitative evaluation of each option's performance against each individual Design Principle, when considered in isolation, which includes a description of how the option has either; Met, Partially Met, or Not Met each principle.

  2. An assessment of each option against the Design Principles, when considered as a set, and the rationale for taking forward an option for further appraisal.

- The main output of the evaluation is a shortlist of viable options to be assessed in further detail as part of the Initial Options Appraisal.

QUESTIONS

5. PRODUCE THE INITIAL OPTIONS APPRAISAL

The goal of the Initial Options Appraisal is to highlight the relative impacts, both positive and negative, of each shortlisted option and compare them against the Do Nothing scenario from part 2.

- The Initial Options Appraisal is the 1st of 3 phases of appraisal that builds the evidence base for the ACP as the proposal matures in response to engagement and consultation.
- To remain proportionate, the initial appraisal is largely based on qualitative information.
- Appendix E of CAP1616, HM Treasury Green Book and DfT WebTAG guidance are used to inform the criteria against which the shortlisted options will be to assessed.
- Some of the specific assessment criteria regarding the potential impacts of aircraft noise will be based on quantitative information during the initial appraisal to ensure consistency.
- Options will be assessed over a 10-year period from the date of implementation.

6. SET OUT THE FULL OPTIONS APPRAISL METHODOLOGY FOR STAGE 3

More quantitative information will be used to conduct the Full Options Appraisal in Stage 3, including the work required to monetise impacts, adopting the structure and rigour of a CBA.

The Full appraisal will include each shortlisted option fully developed, including a commensurate level of detail for the Do Nothing scenario and Do Minimum option:

In this capacity the Full Options Appraisal will include:

a) All reasonable costs and benefits quantified

b) All other costs and benefits described qualitatively

c) Reasons why costs and benefits have not been quantified

d) Detail on the preferred option, setting out reasons for the preference

SUMMARY FLOW CHART FOR DISCUSSION & FEEDBACK

1

1a. Define Sections of Airspace

1b. Flood with Notional Flight Paths

1c. Preliminary Assessment of the Notional Flight Paths

2a. Define the Do Nothing Scenario

2b. Describe the Do Minimum Option

3. Build a Comprehensive List of Options

2

4. Conduct the Design Principle Evaluation to create a shortlist

5. Initial Appraisal of the shortlisted options

3

6. Update the methodology for the Full Options Appraisal

Rounds of engagement during stage 2

1 Engagement to gather feedback on the methodology that we intend to follow to develop and assess airspace change design options during Stage 2.

2 Engagement to gather feedback on the development of a first Comprehensive List of Options for the ACP and the approach to the Design Principle Evaluation.

3 Engagement to present the outputs of the Initial Options Appraisal and gather feedback on how we should refine the appraisal and consult on the options.

NEXT STEPS & CLOSE

- Please respond to LGWairspace.FASIS@gatwickairport.com within 4 weeks (by October 15th) with any further questions or feedback on the methodology.

Thank you.

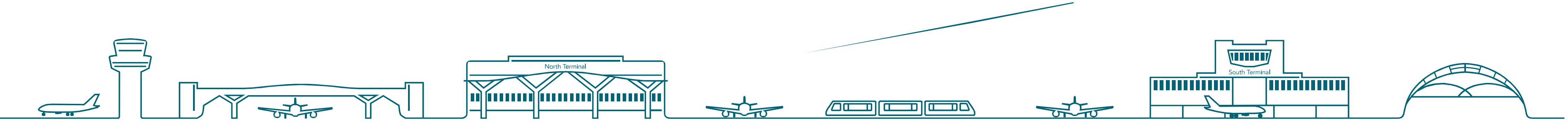
Gatwick Airport FASI South Airspace Change Proposal

Update for stakeholders on the development and assessment of airspace change design options during Stage 2 of the CAP1616 process

Virtual Briefing Session

December 7th and 9th 2021

Version 1.2



1. WELCOME & INTRODUCTIONS

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

Presenters for today's briefing

- Goran Jovanovic – Airspace Change Manager, Gatwick Airport Limited
- Andy Sinclair - Head of Airspace Strategy and Engagement, Gatwick Airport Limited
- Chris Barnes – Director, Trax International Limited
- Nichola Shaw – Consultant, Trax International Limited
- James Trow – Director, Noise Consultants Limited

AGENDA 1 HOUR, 30 MINUTES

1.	Welcome and introductions	5 minutes
2.	Update on the UK Airspace Change Masterplan	10 minutes
3.	Update on the overall timeline for the GAL FASI ACP	10 minutes
4.	Update on the development of the Comprehensive List of Options	20 minutes
5.	Briefing on technology options / operational concepts	15 minutes
6.	Feedback on the effectiveness of our engagement	15 minutes
7.	Question and answer session	15 minutes

YOUR LONDON AIRPORT Gatwick

1. WELCOME & INTRODUCTIONS: DISCUSSION AND FEEDBACK

- The slides will be circulated following the meeting along with a record of the key points raised by participants and all questions and answers.
- We will pause regularly during the presentation to take feedback and questions.
- Please raise your virtual hand using the functionality in MS Teams if you would like to make a contribution, rather than putting questions in the chat.

Thank you.

1. WELCOME AND INTRODUCTION – PROCESS RECAP

The GAL FASI ACP is progressing through Stage 2 of the CAP1616 process, developing and assessing options for the airspace change.

The methodology addresses the requirements laid out in Stage 2 of CAP1616

Step 2A: Develop a first Comprehensive List of Options and evaluate them against the Design Principles to narrow down to a **shortlist**.

Step 2B: Conduct an Initial Appraisal of the options on the **shortlist.**

The Initial Options Appraisal is the 1 of 3 phases of appraisal required to refine the options and introduce progressively more detail to the analysis of costs and benefits:

Stage 2: Develop and Assess

Initial Options Appraisal
Largely qualitative assessment of the shortlisted options to highlight the relative impacts, both positive and negative

Stage 3: Consult

Full Options Appraisal
A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms where possible

Stage 4: Update and Submit

Final Options Appraisal
The full appraisal updated and refined based on the output of the Stage 3 formal consultation with stakeholders

1. WELCOME AND INTRODUCTION – STAGE 2 ROUNDS OF ENGAGEMENT

1

1a. Define Sections of Airspace

1b. Flood with Notional Flight Paths

1c. Preliminary Assessment of the Notional Flight Paths

2

2a. Define the Do Nothing Scenario

2b. Describe the Do Minimum Option

3. Build a Comprehensive List of Options

3

4. Conduct the Design Principle Evaluation to create a shortlist

5. Initial Appraisal of the shortlisted options

4

6. Update the methodology for the Full Options Appraisal

Rounds of engagement during stage 2

1 Engagement to gather feedback on the methodology that we intend to follow to develop and assess airspace change design options during Stage 2.

2 Stakeholder update on progress towards building a Comprehensive List of Options, integration with the Masterplan and technology / operational concepts.

3 Engagement to gather feedback on the development of a first Comprehensive List of Options for the ACP and the approach to the Design Principle Evaluation.

4 Engagement to present the outputs of the Initial Options Appraisal and gather feedback on how we should refine the appraisal and consult on the options.

2. UPDATE ON THE UK AIRSPACE CHANGE MASTERPLAN (1)

The number, complexity and overlapping scope of the changes needed to deliver the Government's airspace modernisation goal requires strategic coordination in the form of a Masterplan.

- The Department for Transport and CAA, as co-sponsors of airspace modernisation, commissioned the production of the UK Airspace Change Masterplan.
- Given the large number of organisations involved (NERL + 21 airports), the Airspace Change Organising Group (ACOG) was established to develop the Masterplan, coordinate the Programme and lead the necessary engagement with external stakeholders.
- The Masterplan includes (at least):
  - 21 airport-led ACPs to upgrade arrival and departure routes below 7000ft.
  - 7 NERL-led ACPs to upgrade the airspace structures and network above 7000ft.

2. UPDATE ON THE UK AIRSPACE CHANGE MASTERPLAN (2)

The number, complexity and overlapping scope of the changes needed to deliver the Government's airspace modernisation goal requires strategic coordination in the form of a Masterplan.

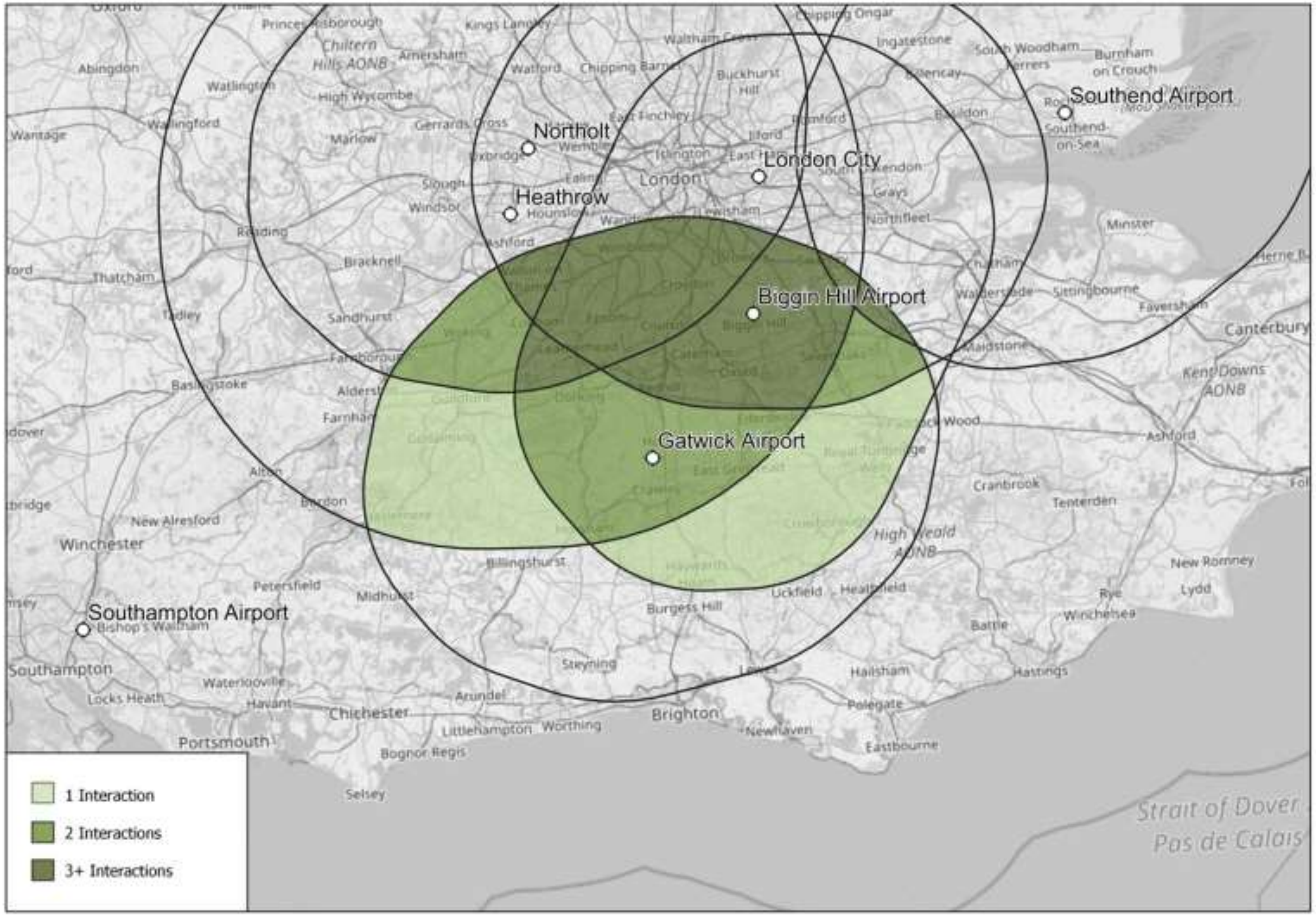
- The final Masterplan will be developed in a series of Iterations and will take some time.
- Airspace modernisation is a long and complex process.
- Larger ACPs with many interdependencies can take longer than smaller ones with fewer.
- The background context and policies associated with modernisation are evolving.
- Iteration 2 was developed by ACOG between August and November 2021 and submitted to the CAA for assessment in December 2021.

2. UPDATE ON THE UK AIRSPACE CHANGE MASTERPLAN (3)

The number, complexity and overlapping scope of the changes needed to deliver the Government's airspace modernisation goal requires strategic coordination in the form of a Masterplan.

- Iteration 1 of the Masterplan set out the high-level concepts, key risks and opportunities.
- Iteration 2 sets out a system-wide view of proposals to modernise the airspace based on the information available from each ACP's CAP1616 Stage 1 and Stage 2 information and identifies the potential conflicts between the constituent ACPs.
- ACPs included in the Masterplan will be unable to progress beyond Stage 2 of the CAP1616 process until the potential interdependencies with other ACPs (and therefore the requirements for coordination) are set out in accepted version of Iteration 2.
- Iteration 3 will be developed during 2022 using the options developed by the constituent ACPs to examine the cumulative impacts of the changes and the necessary trade-offs.

2. UPDATE ON THE UK AIRSPACE CHANGE MASTERPLAN (4)

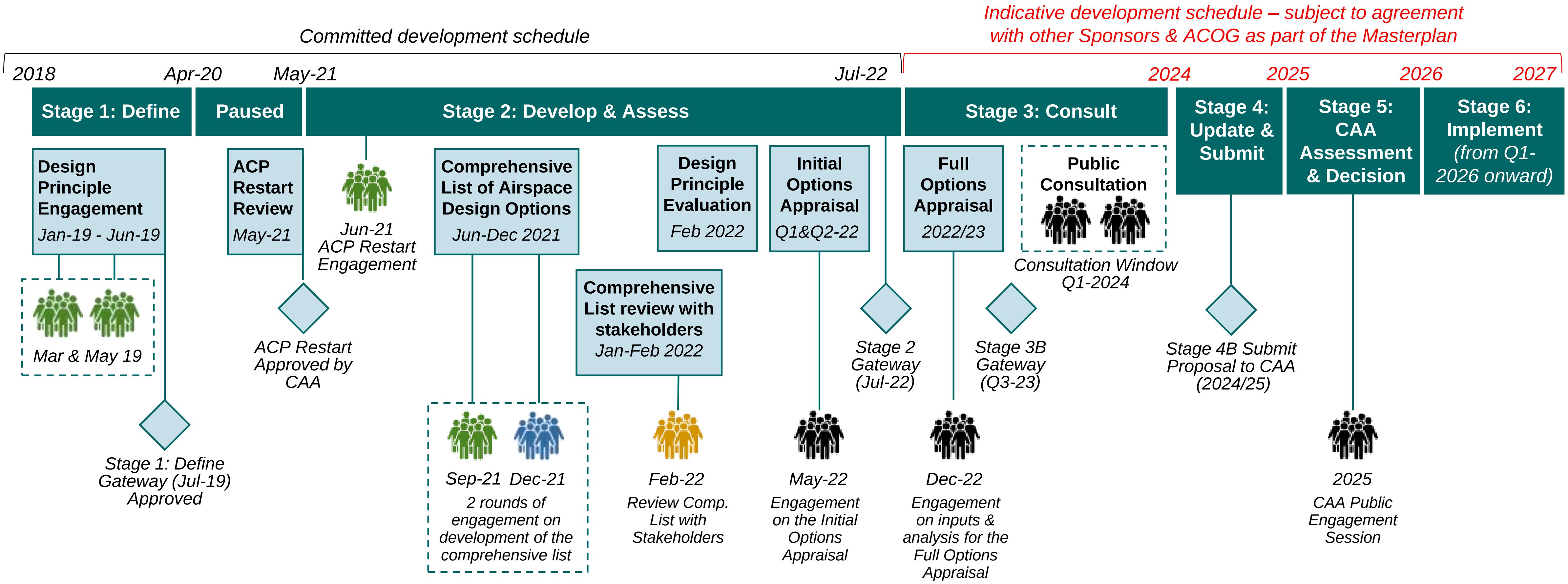


- The Gatwick FASI ACP share potential interdependencies with ACPs sponsored by Heathrow, London City, Biggin Hill, Southend, RAF Northolt and NATS.

Questions

YOUR LONDON AIRPORT Gatwick

3. UPDATE ON THE OVERALL TIMELINES FOR THE GAL FASI ACP



4. UPDATE ON THE DEVELOPMENT OF THE COMPREHENSIVE LIST OF OPTIONS

At Stage 2A CAP1616 requires ACP sponsors to develop a comprehensive list of options that address the Statement of Need and align with the Design Principles developed with stakeholders at Stage 1B. We then test this comprehensive list of options with stakeholders to ensure we have sufficiently accounted for the Design Principles and any stakeholder concerns related to the Design Principles.

As presented at the previous stakeholder workshops held in September and October, we have chosen to take a data-based approach when developing our Comprehensive List. We will achieve this by developing an Airspace Design Database.

At this briefing session, we will update on the development of the Airspace Design Database which is under configuration. As part of the session, we will show the functionality of the database however it is important to note that **what we are showing today are not the final outputs from the database**. We will cover this as part of our workshops in Q1 of 2022 when share our Comprehensive List of Options with stakeholders.

AIRSPACE DESIGN DATABASE: RECAP

The Airspace Design Database collates a core set of information needed to clearly demonstrate how each option has been identified and why the first list is considered sufficiently comprehensive.

Sections of Airspace

The database will cover all geographical sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.

Notional Flight Paths

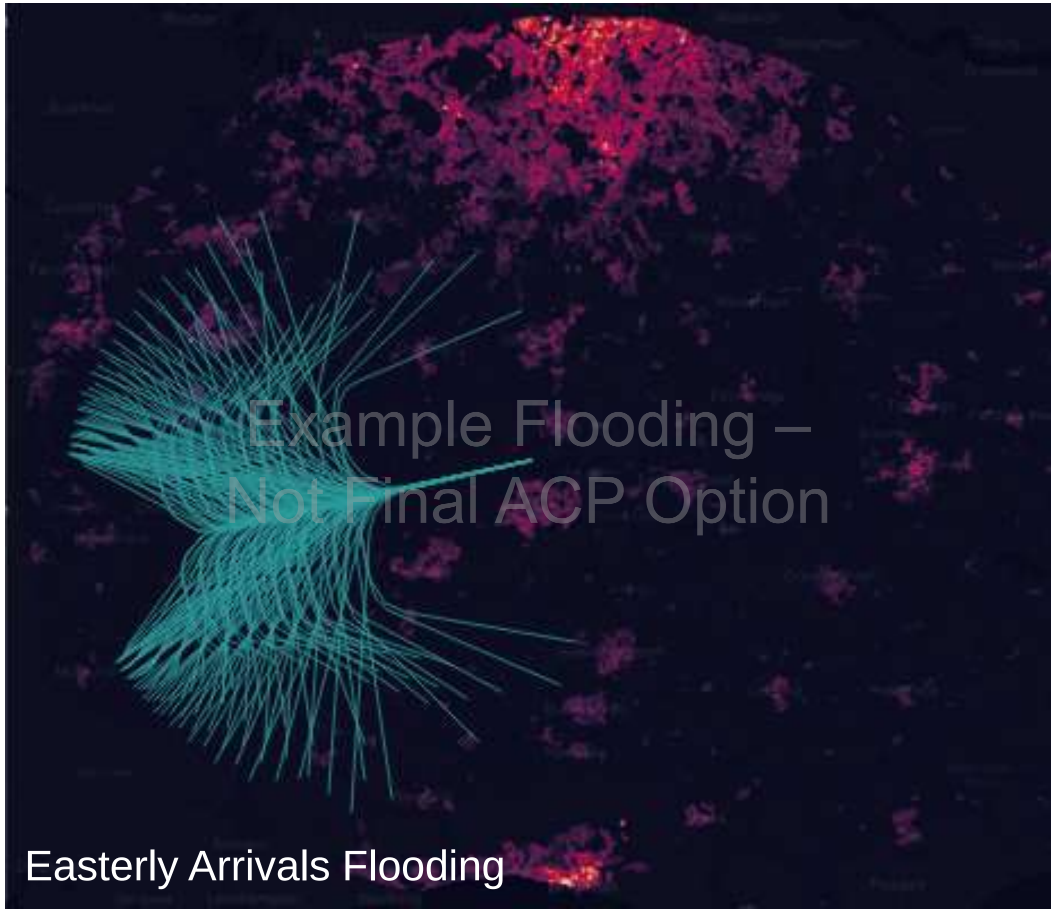
We will define the broad range of notional flight paths that are technically possible within each section of airspace – an approach known as flooding.

Preliminary Assessment

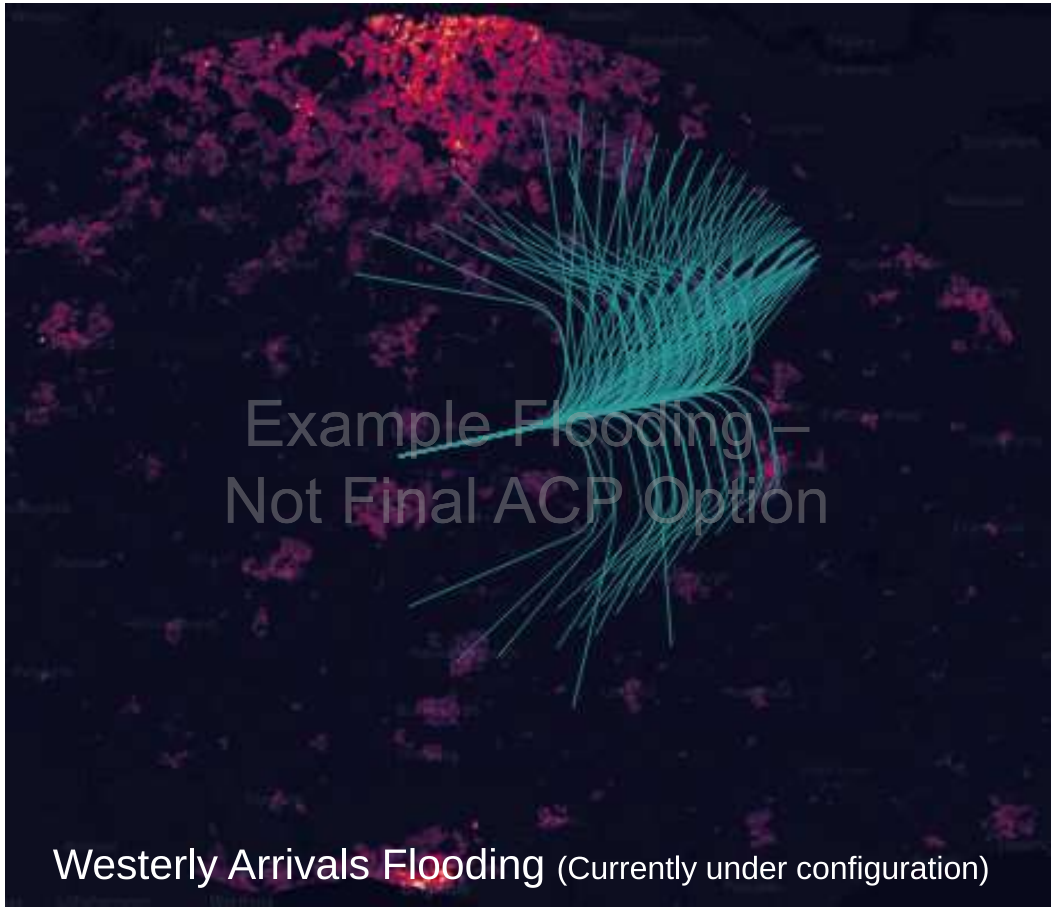
A core set of information will be produced through a preliminary assessment of the performance of each individual notional flight path using a variety of noise and overflight measurements.

AIRSPACE DESIGN DATABASE: ARRIVAL INPUTS

The Airspace Design Database contains information on thousands of notional flight paths which were developed as part of the 'flooding' exercise:



Easterly Arrivals Flooding

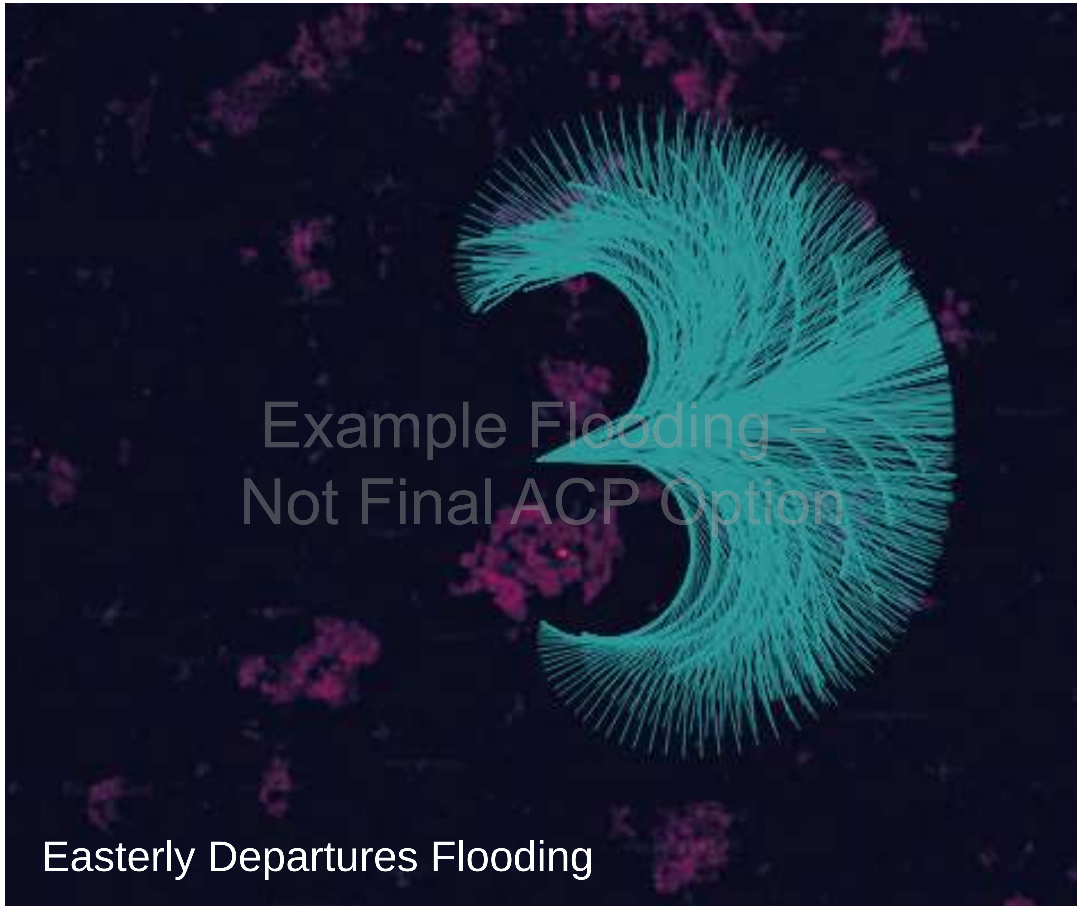


Westerly Arrivals Flooding (Currently under configuration)

AIRSPACE DESIGN DATABASE: DEPARTURE INPUTS

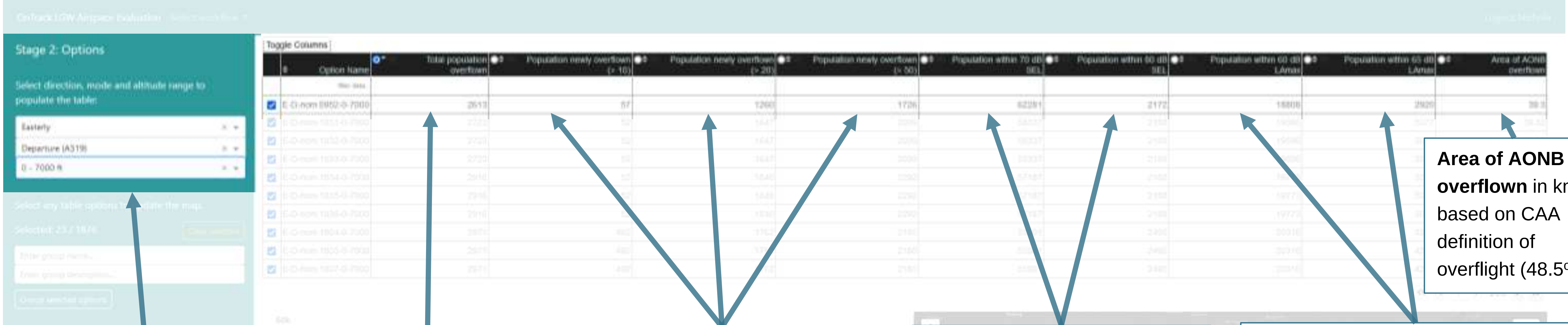
The Airspace Design Database contains information on thousands of notional flight paths which were developed as part of the ‘flooding’ exercise:

Westerly Departures Flooding



Easterly Departures Flooding

4. UPDATE ON THE DEVELOPMENT OF THE COMPREHENSIVE LIST OF OPTIONS



Area of AONB overflown in km^2 based on CAA definition of overflight (48.5º)

The notional flight path data is initially filtered by:

- Direction (Easterlies or Westerlies),
- Mode (Arrivals or Departures), and
- Altitude range (0-4000ft and 0 – 7000ft).

Once selected, the table is populated with the corresponding notional flight path data.

Total population overflown

The database tells us the total number of population overflown.

This is calculated using an overflight contour which is based on the CAA's definition of overflight (48.5º cone).

Population newly overflown

The database tells us the number of people newly overflown where they are not already overflown at least 10, 20 or 50 times a day on average.

It uses overflight contours which are based on the CAA's definition of overflight (48.5º) and 2019[1] flight track data.

[1]Information within the database has been adjusted to reflect the extant route 4 procedure

Population with 70dB and 80dB SEL

The database calculates the number of people within the 70 dB and 80 dB Sound Exposure Level (SEL) contours.

The SEL data shows the population exposed above a certain level from a single noise event. They are an indicator of the primary metrics we will appraise later in the process (L_{Aeq} contours)

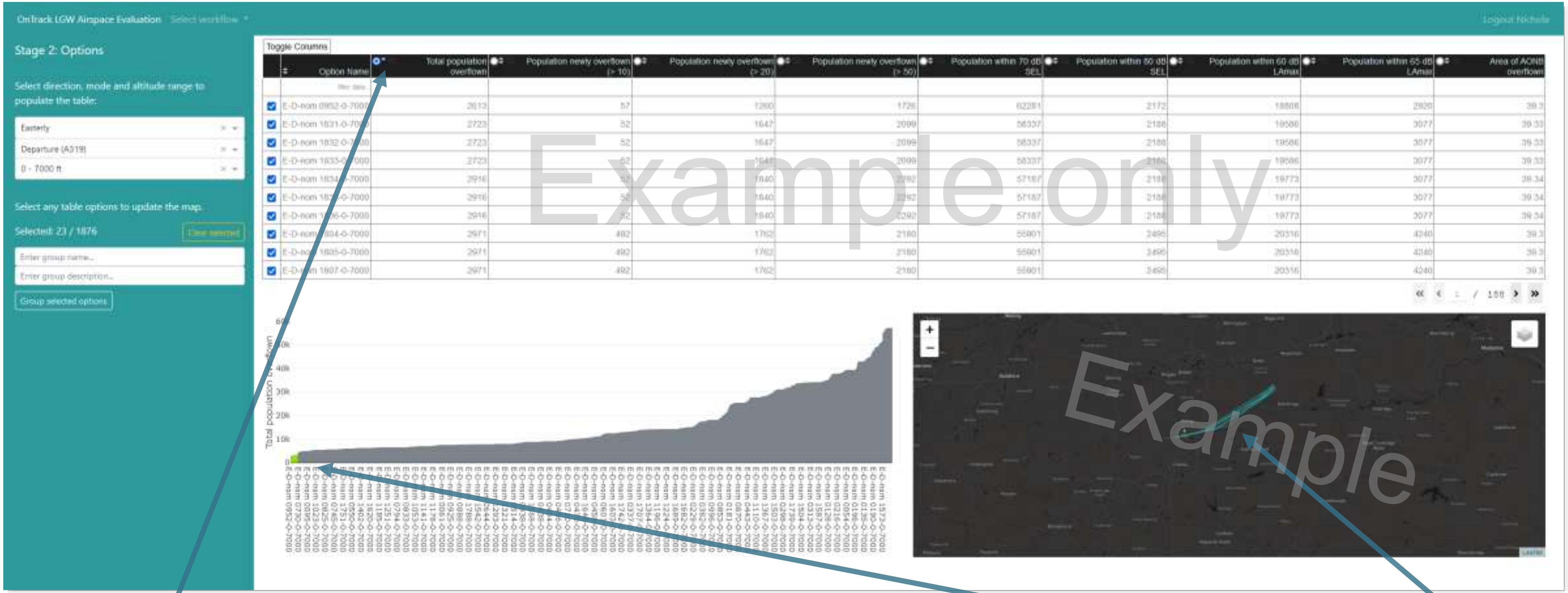
Population with 60dB LAmax and 65dB LAmax

The database calculates the number of people within the 60 dB and 65dB L_{Amax} contours.

L_{Amax} contours show the locations where the number of events exceed a pre-determined noise level.

These are an indication of secondary metrics used as part of the CAP1616 process.

4. UPDATE ON THE DEVELOPMENT OF THE COMPREHENSIVE LIST OF OPTIONS



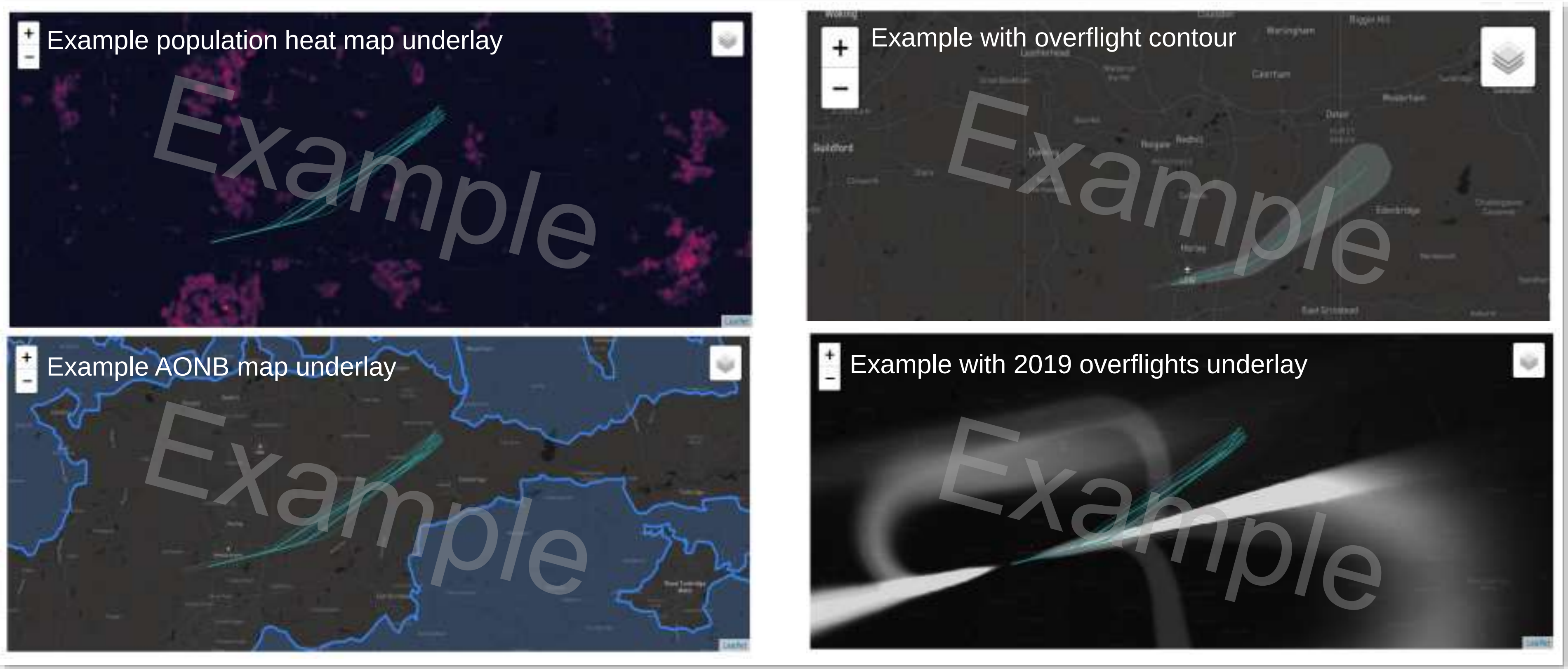
Metrics are sorted to identify high performing notional flight paths. This updates the table and the graph. Here we have ordered the data from low to high to identify the paths that overfly the lowest number of population.

Trends in performance are identified using the graph. Groups of notional flight paths can be selected to examine in further detail.

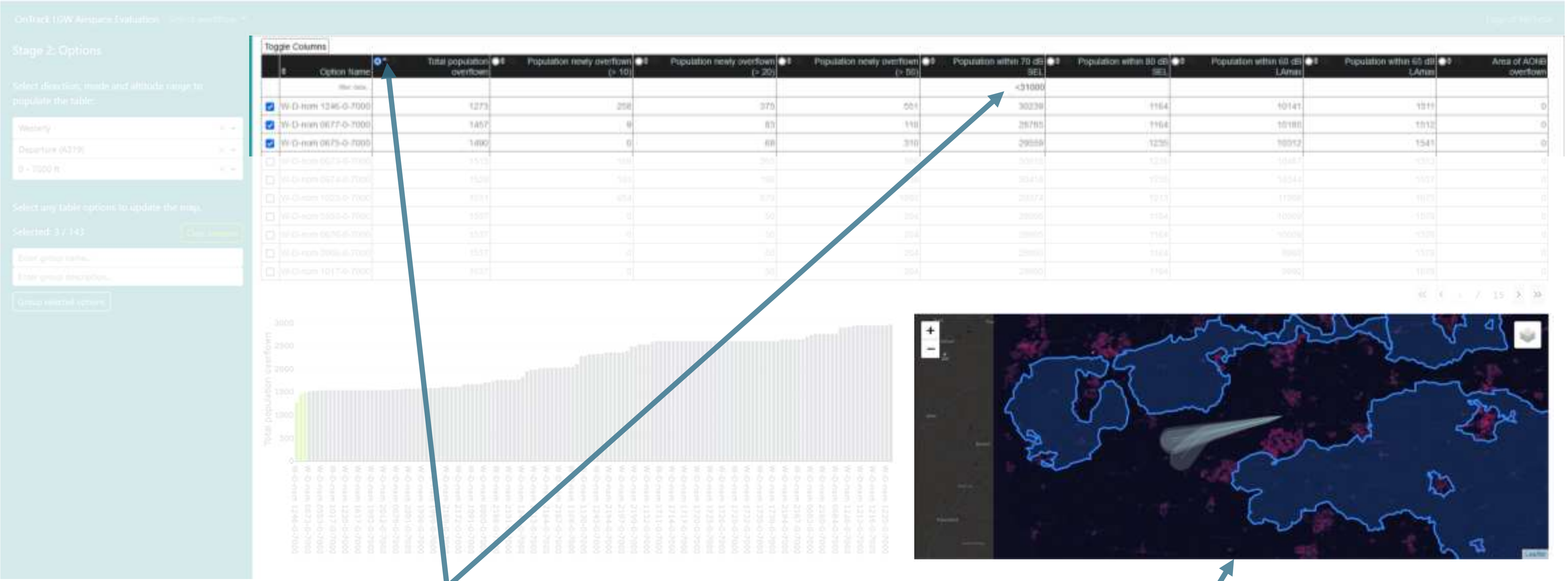
Selected notional flight paths are displayed on the map.

4. UPDATE ON THE DEVELOPMENT OF THE COMPREHENSIVE LIST OF OPTIONS

Map underlays aid analysis by displaying different information such as population heat maps, 2019 overflight and AONB. Flight centerlines can also be selected to show the overflight contour. Some of these map backgrounds will be used when we present out Comprehensive List of Options.



4. UPDATE ON THE DEVELOPMENT OF THE COMPREHENSIVE LIST OF OPTIONS



Multiple metrics can be used to filter the data in order to identify high performing notional flight paths that best meet our design principles. In this <u>example</u> the top ~150 paths for the 70dB SEL metric all have a population count of under 31,000 and the data has been filtered to only show these paths. They have then been sorted from low to high against the total population overflown metric, and the top three paths selected.

Maps and other data columns can be interrogated to test the overall performance of the notional flight paths. In this <u>example</u> we can see that the top three paths previously selected do not overfly the AONB shown in blue on the map.

4. UPDATE ON THE DEVELOPMENT OF THE COMPREHENSIVE LIST OF OPTIONS

When we develop our Comprehensive List of Options, we plan to develop options that minimise newly overflown and options that minimise total population overflown. We will also undertake analysis to help us identify notional flight paths that balance both. In the later stages of the CAP1616 process, we will evaluate and appraise the benefits and impacts of each option therefore neither approach will be ruled out at this stage.

Next steps:

1. Airspace Design Database

Finalise the configuration of the Airspace Design Database

2. Build System Options

Bring together combinations of high performing notional flight paths to create workable system options (groups of arrival or departure paths) that meet our Design Principles and Statement of Need.

Comprehensive List of Options

3. Stakeholder Engagement

Engage with Stakeholders on the Comprehensive List of Options.

Where required, develop or refine options following engagement.

4. Design Principle Evaluation

Evaluate each of the options on the Comprehensive List against each Design Principle. The outcome of the Design Principle Evaluation will be a shortlist to take forward to the Initial Options Appraisal.

Questions

5. BRIEFING ON TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS (1)

The Airspace Modernisation Strategy sets out an innovative and ambitious concept for the modernisation of the terminal airspace based on three important goals:

1. Each airport in the terminal area is served by its own dedicated set of arrival and departure routes between the ground and the en route network.
2. All routes in the terminal airspace are separated by design, do not interact with one another as much as today, and can be operated more independently.
3. In routine operations, aircraft in the terminal airspace fly the routes as designed. Air traffic controllers are not required to intervene tactically, take aircraft off their planned routes and vector to manage crossing traffic, absorb delays or create airspace capacity.

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS (2)

The technology options and operational concepts that are required for airspace modernisation can be grouped into five areas:

- **PBN:** The widespread deployment of Performance-based Navigation routes.
- **ATM system upgrades:** The introduction of new air traffic systems that improve flight information and automate controller tasks.
- **Arrival management tools:** The use of air traffic tools and procedures to manage arrival delays.
- **Time-based operations:** The use of avionics, air traffic tools and procedures that enable time-based operations for the sequencing and spacing of traffic flows.
- **Aircraft avionics:** The evolution of aircraft airframes, avionics and flight management systems.

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS: PBN

The widespread deployment of new routes designed and operated to more advanced PBN standards is a technological cornerstone of the Masterplan ACPs.

- In general terms, there are three standards of PBN available to support the airspace changes required for modernisation:
  - **RNAV1 –** the basic standard for new routes in the terminal airspace, which refers to the use of area navigation (RNAV) with a track keeping accuracy of +/- 1 nautical mile.
  - **RNP1 –** a more advanced standard, Required Navigation Performance (RNP) with a track keeping accuracy of +/-1 nautical mile and improved precision in the turn.
  - **RNP-AR –** specifically for the final approach phase, enabling track-keeping accuracy of between 0.3 and 0.1 nautical miles and the flexibility to fly curved approaches.

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS: ATM SYSTEM UPGRADES

NERL is upgrading the flight data processing (FDP) systems used by its controllers to monitor the progress of flights and manage the performance of the network.

- The new generation of FDP systems offer significantly more flight information and automate some routine tasks so that controllers have more time and more options to manage the flow of traffic across the network.
- Once complete, the upgrades to FDP systems are expected to significantly increase airspace capacity and efficiency by improving the accuracy of information provided about forecast flight positions, profiles, route adherence and potential conflicts.
- The Masterplan ACPs should be designed to maximise the potential benefits of the new FDP systems, which are expected to enter full operational service after the new route network is designed and deployed.

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS: ARRIVAL MANAGEMENT TOOLS

Arrival holds are used in the existing airspace system to absorb airborne delays that arise when the demand for an airports' runway exceeds the available capacity

- this has proved to be an effective method to maintain high runway throughput but is not environmentally efficient, creating excess emissions and noise impacts.
- greater use of arrival management tools (that are already in place today) enables flights to absorb more delays during the en route phase of flight, using accurate speed controls, and stream traffic into an efficient order for landing.
- The full benefits of airspace modernisation are enabled by the evolution of arrival management tools (increasing their range, functionality and the amount of delay that can be absorbed) integrating effectively with the updated arrival routes.
- The goal is to reduce the reliance on arrival holding and support time-based operations.

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS: TIME BASED OPERATIONS

Time-based Operations organise the arrival sequence some distance from the airport, where it is generally more efficient, and thereby reduce the need for vectoring at lower altitudes.

- In the long-term airspace modernisation envisages four-dimensional management of each flight's trajectory.
- The goal is to share consistent information about exactly where an aircraft is expected to be - and when – at key points along the route.
- Time-based operations work with PBN to enable aircraft to more accurately navigate their routes and improve the accuracy of the time predictions.
- As TBO technology develops and is more widely adopted and shared, controllers and pilots may be able to manage the arrival time of most flights to within a few seconds, enabling aircraft to land without the need for holding or vectoring.

5. TECHNOLOGY OPTIONS AND OPERATIONAL CONCEPTS: AIRFRAME & AVIONICS

The Masterplan ACP sponsors are working closely with aircraft manufacturers to understand the timescales for airframe and avionics developments across the fleet.

- A portion of the fleet operating at the time that the airspace changes are first deployed will not have the airframe or avionics capabilities needed to maximise performance.
- ACPs must meet certain criteria to ensure all aircraft required to use them can do so.
- For example, at first air traffic controllers will still be required to intervene tactically to provide the vertical separation between any new routes that are not laterally separated.
- Vertical separation between routes may still need to be quite broad to account for the differences in climb performance and the capability of the aircraft.
- As technology develops and the fleet evolves, the vertical separations may be narrowed and the requirement for controller intervention should steadily reduce.

Questions

6. FEEDBACK ON OUR ENGAGEMENT

Please outline what is working well in the engagement process and how Gatwick Airport can improve its engagement in the future?

When providing feedback, please consider:

- **Format**

  We've held our sessions online due to COVID-19; are there any different channels or ways that we could improve engagement? Would alternative times of day such as evenings be more convenient for some stakeholders?

- **Content:**

  We're aware that Airspace Change can be technical and complex, is there anything we can do to improve our Stakeholder engagement material?

- **Number of engagement sessions:**

  CAP1616 requires us to hold one round of engagement at Stage 2, however we have chosen to hold more. Are we getting the balance right between too many or too few engagement workshops?

NEXT STEPS & CLOSE

- Please respond to LGWairspace.FASIS@gatwickairport.com by Friday 2nd February with any further questions or feedback.

Thank you.

7. QUESTIONS AND ANSWERS

YOUR LONDON AIRPORT
Gatwick

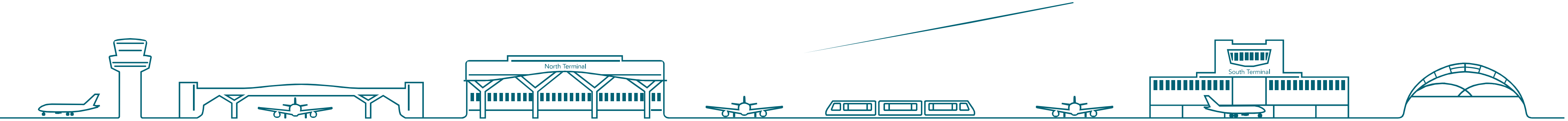
Gatwick Airport FASI South Airspace Change Proposal

Stakeholder briefing on the comprehensive list of airspace design options for Stage 2 of the CAP1616 process

Virtual meeting

February 15th / 17th / 23rd 2022

Version 2 - Final



GLOSSARY

ACP	Airspace Change Proposal	A request (usually from an airport or air navigation service provider) for a permanent change to the design of UK airspace. An airspace change sponsor must follow a 7-stage process explained in the CAA's document CAP 1616 Airspace Design Guidance.
ANG	Air Navigation Guidance	Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management.
AMS	Airspace Modernisation Strategy	A coordinated strategy and plan for the use of UK airspace for air navigation up to 2040, including for the modernisation of the use of such airspace, prepared and maintained by the CAA.
ATC	Air Traffic Control	Responsible for the safe separation of traffic in controlled airspace
CAA	Civil Aviation Authority	Independent aviation regulator and responsible for the adjudication of airspace change proposals
CCO / CDO	Continuous climb operations / Continuous descent ops	Allow arriving or departing aircraft to descend or climb continuously, to the greatest extent possible.
	Comprehensive List of Options	A list of viable options an airspace change sponsor develops as part of Stage 2 of the CAP1616 process. The list aims to address the statement of need and align with the Design Principles developed at Stage 1.
DfT	Department for Transport	Department for Transport. Co-sponsors with the CAA of the Airspace Modernisation Strategy
DP	Design Principle	Developed as part of Stage 1 of the airspace change process
FASI-S	Future Airspace Strategy Implementation – South	The coordinated programme of airspace modernisation in southern England,
NATS	Formerly known as 'National Air Traffic Services	Provide air traffic services across the UK. NATS NERL (NATS (En Route) plc) are responsible for the upper airspace change (airspace network above 7000ft)
	Notional Flight Path	A path based on the basic principles of Instrument Flight Procedure (IFP) design that is used to flood sections of airspace. Notional flight paths are not airspace change options, but assessment of the paths provides a core set of environmental information that can be used when developing routes and options.
	Option	At this stage, an option is one complete system of either arrival or departure routes from the same runway end.
PBN	Performance Based Navigation	A concept that moves aviation away from the traditional use of aircraft navigating by ground-based beacons to a system more reliant on airborne technologies, utilising satellite systems and improving navigation accuracy and performance.
	System	A workable group of arrival or departure routes from the same runway end
	Vectoring	Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an Air Traffic Services surveillance system.

1. WELCOME & INTRODUCTIONS

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

Presenters for today's briefing

- Goran Jovanovic – Airspace Change Manager, Gatwick Airport Limited
- Andy Sinclair – Head of Airspace Strategy and Engagement, Gatwick Airport Limited
- Chris Barnes – Director, Trax International Limited
- Dave Jones – Head of Airspace and Procedure Design, Trax International Limited
- Nichola Shaw – Airspace Change Specialist, Trax International Limited

The slides will be circulated following the workshops

1. WELCOME & INTRODUCTIONS

1. Welcome and introductions
2. Background to the GAL FASI ACP
3. Purpose of engagement on the comprehensive list of options.
4. Approach to developing the comprehensive list of options
5. Comprehensive list of options overview
6. Focus of this engagement exercise
7. Next steps

1. WELCOME & INTRODUCTIONS

- The slides and our full comprehensive list of options will be circulated following the meetings.
- We will pause regularly during today’s presentation to take feedback and questions.
- Please raise your hand using the functionality in MS Teams if you would like to contribute, rather than putting questions in the chat.

Thank you.

2. BACKGROUND TO THE GAL FASI ACP

The UK's Airspace Modernisation Strategy identifies the need to fundamentally redesign the UK's airspace system to meet the demand for air transport in a sustainable and resilient way.

- Airspace modernisation in Southern England is being delivered as a single coordinated programme known as FASI (Future Airspace Strategy Implementation) South.
- The DfT asked all affected airports, and NATS, to develop Airspace Change Proposals (ACPs) as part of the FASI-South Programme.
- All ACPs are required to follow the UK Civil Aviation Authority's (CAA's) seven-stage process for changing the airspace design (known as CAP1616).
- The Gatwick Airport Limited (GAL) FASI-South ACP is currently in Stage 2 of 7.
- The interdependencies between FASI-South ACPs must be coordinated to optimise the overall design. The Airspace Change Organising Group (ACOG) was established to deliver this coordination through the development of an Airspace Change Masterplan.

2. BACKGROUND: STAGE 1 AIRSPACE DESIGN PRINCIPLES

At Stage 1 of the CAP1616 process, Gatwick submitted a Statement of Need, and then developed the following Design Principles through engagement with stakeholders. In July 2019 Gatwick passed the Stage 1 Define Gateway.

#	Design Principle*	Description
1	Safety by Design	Must at least maintain, and ideally enhance, aviation safety, by reducing or removing safety risk factors, provided enhancement does not have a detrimental impact on other benefits. (CORE)
2	Enhanced Navigation Standards	Should adopt the most beneficial enhanced navigation standards for new routes. (CORE)
3	Limit Adverse Noise Effects	Shall aim to limit and where possible reduce the adverse impacts of aircraft noise. (CORE)
4	Time Based Arrival Operations	Should be compatible with the adoption of time-based arrival operations.
5	Resilience Built In	Should be materially unaffected by most disruptions, including poor weather and technical failures, through the provision of adequate contingencies.
6	Optimise Use of Aircraft Capabilities	Should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance.
7	Long Term Predictability & Adaptability	Should offer long term predictability of flight paths and respite and offer adaptation for the future airport development scenarios outlined in our draft Masterplan.
8	Deconfliction by Design	Should seek, where possible, to deconflict routes by design below 7000ft, and the prevalence of overflight of a community by flights on different routes and/or by neighbouring airport traffic.
9	Locally Tailored Designs	Should enable decisions which affect how aircraft noise is best distributed to be informed by local circumstances and consideration of different options.

*More detail on the background and application of the GAL FASI ACP Airspace Design Principles can be found here

2. BACKGROUND: STAGE 2 DEVELOP AND ASSESS OPTIONS

In the 1st round of engagement to support the Stage 2 activities (Q3/Q4-2021), we sought feedback on the methodology that we proposed to follow to develop and assess airspace design options for the GAL FASI ACP.

The methodology addresses the requirements laid out in Stage 2 of CAP1616

Step 2A: Develop a first Comprehensive List of Options and evaluate them against the Design Principles to narrow down to a shortlist.

Step 2B: Conduct an Initial Appraisal of the options on the shortlist.

The Initial Options Appraisal is the 1 of 3 phases of appraisal required to refine the options and introduce progressively more detail to the analysis of costs and benefits:

Stage 2: Develop and Assess	*Stage 3: Consult*	*Stage 4: Update and Submit*
Initial Options Appraisal Largely qualitative assessment of the shortlisted options to highlight the relative impacts, both positive and negative	**Full Options Appraisal** A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms where possible	**Final Options Appraisal** The full appraisal updated and refined based on the output of the Stage 3 formal consultation with stakeholders

2. BACKGROUND: STAGE 2 TIMELINE EXTENSION AND ENGAGEMENT EXPANSION

We have extended our timeline to facilitate greater engagement with NATS, Airports and other stakeholders:

Sep to Dec 2021

1

1a. Define Sections of Airspace

1b. Flood with Notional Flight Paths

1c. Preliminary Assessment of the Notional Flight Paths

2

Jan to Apr 2022

2. Build a Comprehensive List of Options

3

3. Refine options using feedback and define the Do Nothing Scenario

May 2022

4. Conduct the Design Principle Evaluation to create a shortlist

4

Sep 2022

5. Initial Appraisal of the shortlisted options

5

6. Update the methodology for the Full Options Appraisal

Three to five rounds of engagement during stage 2

1 Engagement to gather feedback on the methodology that we intend to follow to develop and assess airspace change design options during Stage 2.

2 Stakeholder update on the progress towards building a Comprehensive List of Options, integration with the Masterplan and technology / operational concepts.

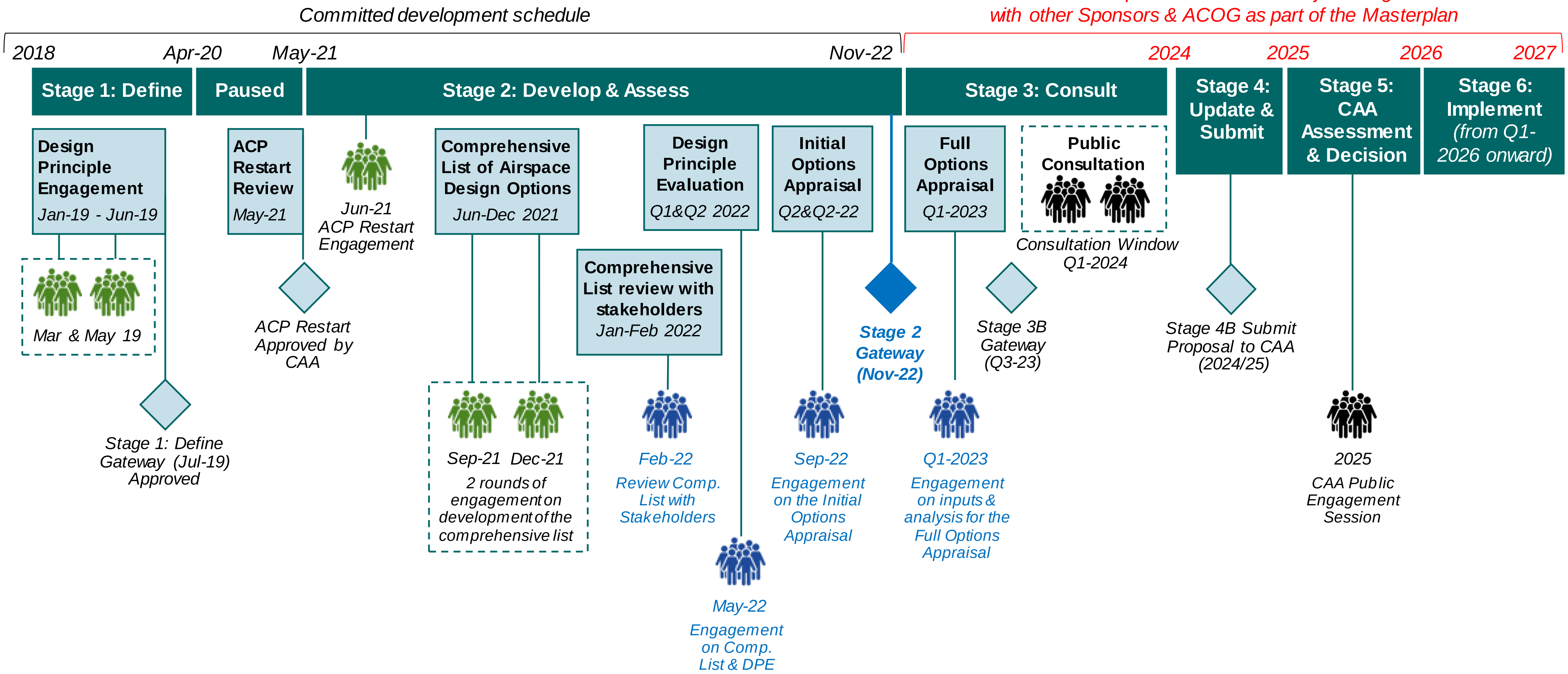
3 Engagement to gather feedback on the development of a first Comprehensive List of Options for the ACP.

4 Engagement on how the outputs the engagement so far have shaped the options on the comprehensive list and the approach to the Design Principle Evaluation.

5 Engagement to present the outputs of the Initial Options Appraisal and gather feedback on how we should refine the appraisal further and consult on the options in Stage 3.

2. BACKGROUND: OVERALL ACP TIMELINE UPDATE

The following diagram shows the extended Stage 2A timeline within the overall ACP timeline:



3. PURPOSE OF THE COMP. LIST OF OPTIONS ENGAGEMENT

We believe we have produced a comprehensive list of all viable airspace design options for the ACP that align with the design principles and address the issues set out in the Statement of Need.

The purpose of this engagement is to test the comprehensive list of options with the same group of representative stakeholders that have participated in the development of the ACP so far:

- Local community, environmental and special interest groups
- Councils and public officials
- Airspace users and other aviation stakeholders

3. PURPOSE OF THE COMP. LIST OF OPTIONS ENGAGEMENT

We believe we have produced a comprehensive list of all viable airspace design options for the ACP that align with the design principles and address the issues set out in the Statement of Need.

We are seeking feedback on the following:

1. Is the list of options sufficiently comprehensive (is anything missing)?
2. Is the list of options developed in line with the design principles?
3. Are there any other considerations that we should take into account regarding the development of a comprehensive list of options for the ACP?

The feedback will be used to:

- Refine options
- Develop new options where appropriate.

We are not seeking feedback on the position of each individual flight path included in the options. That will happen later in the process as we conduct the Initial and Full Options Appraisals, and ultimately during the Public Consultation on the ACP.

FEEDBACK & QUESTIONS

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS

Our methodology is organised into six parts aligned to the CAP1616 requirements for developing & assessing options

1	**Develop an Airspace Design Database**	Define sections of airspace where a flight path could conceivably be positioned within the scope of the ACP.
2	**Define Do Nothing and Do Minimum Options**	Describe the Do-Nothing Scenario as a baseline and a ‘Do Minimum’ option if the ‘Do Nothing’ is not viable.
3	**Build the Comprehensive List of Options**	Set out all viable options that address the Design Principles and the scope of the ACP as described in the Statement of Need
4	**Conduct the Design Principle Evaluation**	Examine how well each option aligns with the Design Principles and shortlist the options to progress to the Initial Options Appraisal.
5	**Produce the Initial Options Appraisal**	Conduct a largely qualitative assessment of the impacts, both positive and negative, of the shortlisted options.
6	**Set out the Full Options Appraisal Methodology**	Describe the methodology for producing a quantitative appraisal with monetized costs and benefits in Stage 3.

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS

Our Airspace Design Database collates a core set of information needed to clearly demonstrate how each option has been identified and why the first list is considered sufficiently comprehensive.

Sections of Airspace

The database will cover all geographical sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.

Notional Flight Paths

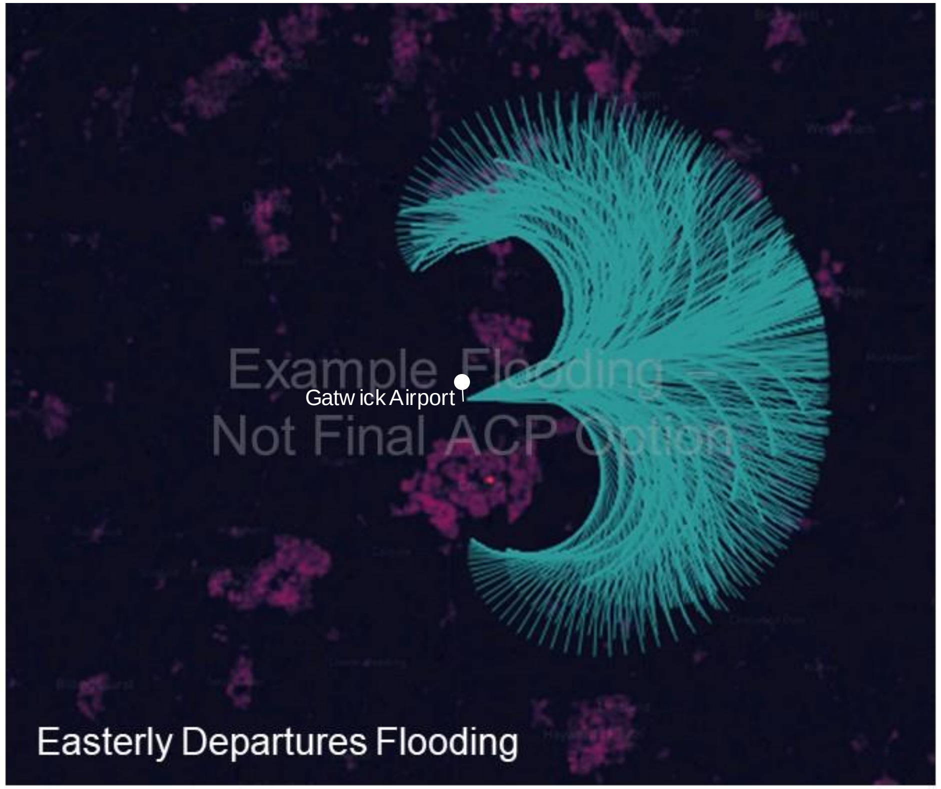
We will define the broad range of notional flight paths that are technically possible within each section of airspace – an approach known as flooding.

Preliminary Assessment

A core set of information will be produced through a preliminary assessment of the performance of each individual notional flight path using a variety of noise and overflight measurements.

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS

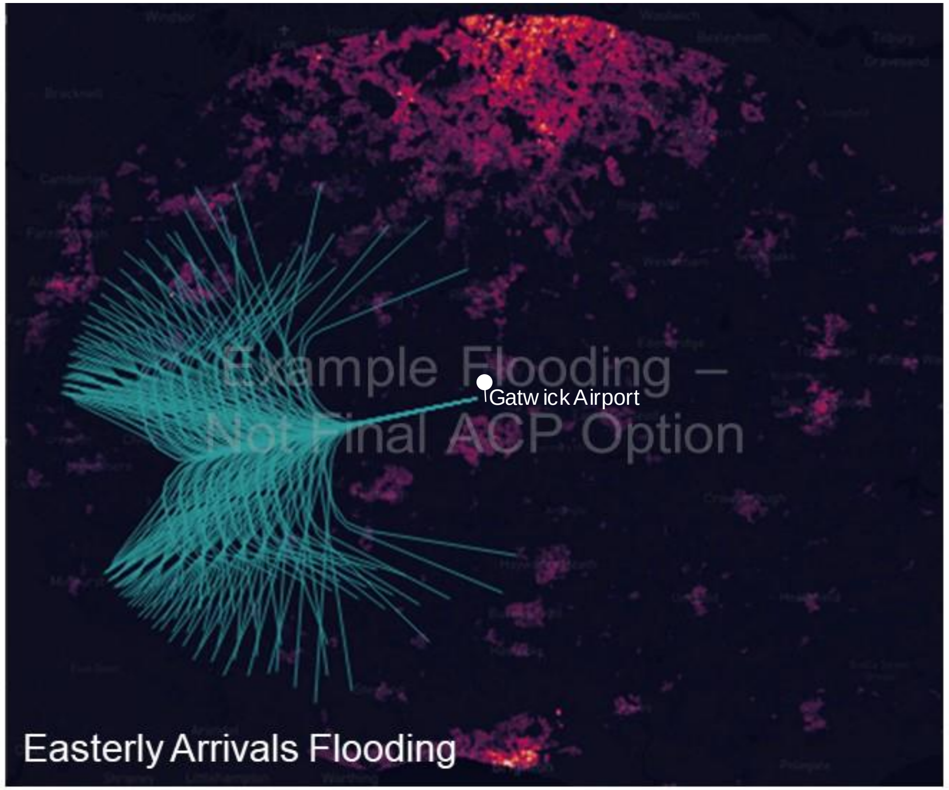
The options are built from a core set of information about all the sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.

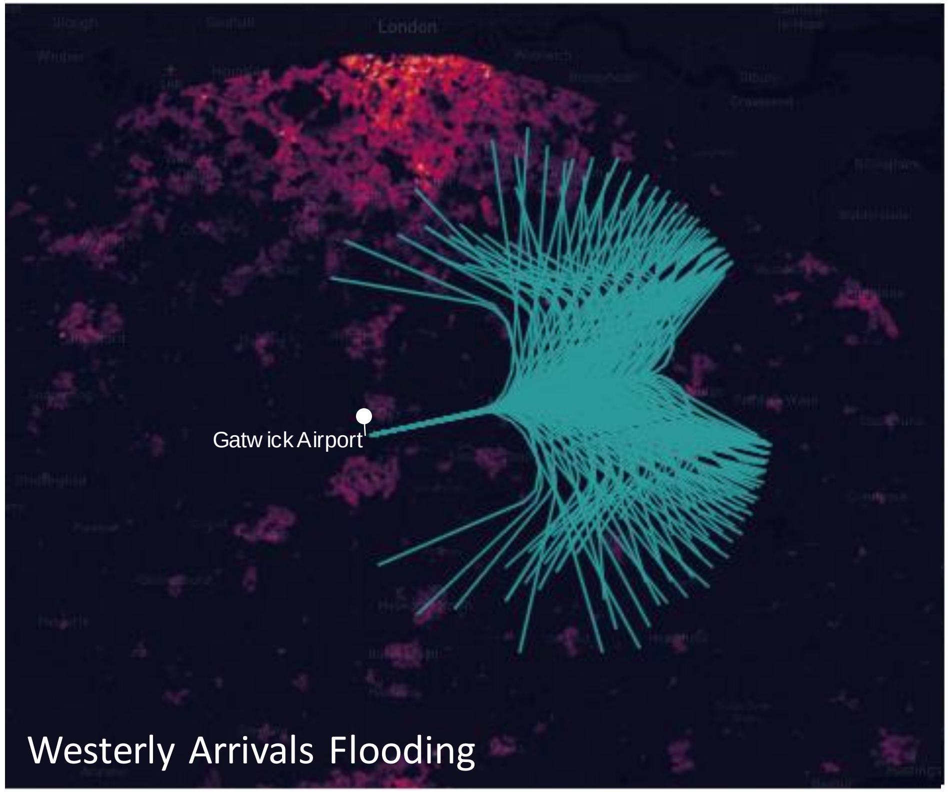


All notional flight paths assume continuous climb to 7000ft

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS

The options are built from a core set of information about all the sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.





All notional flight paths assume continuous descent from 7000ft

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS

The preliminary assessment gave us noise data on each of the notional flight paths and using our database we were able to identify the comparatively higher performing paths:

OnTrack LGW Airspace Evaluation Select workflow Logout Nichola

Stage 2: Options

Select direction, mode and altitude range to populate the table:

Easterly

Departure (A319)

0 - 7000 ft

Select any table options to update the map.

Selected: 23 / 1876 Clear selected

Enter group name...

Enter group description...

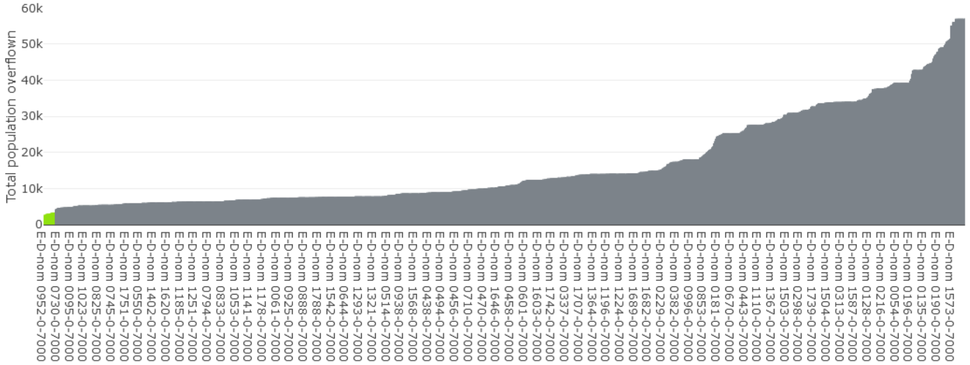
Group selected options

Toggle Columns

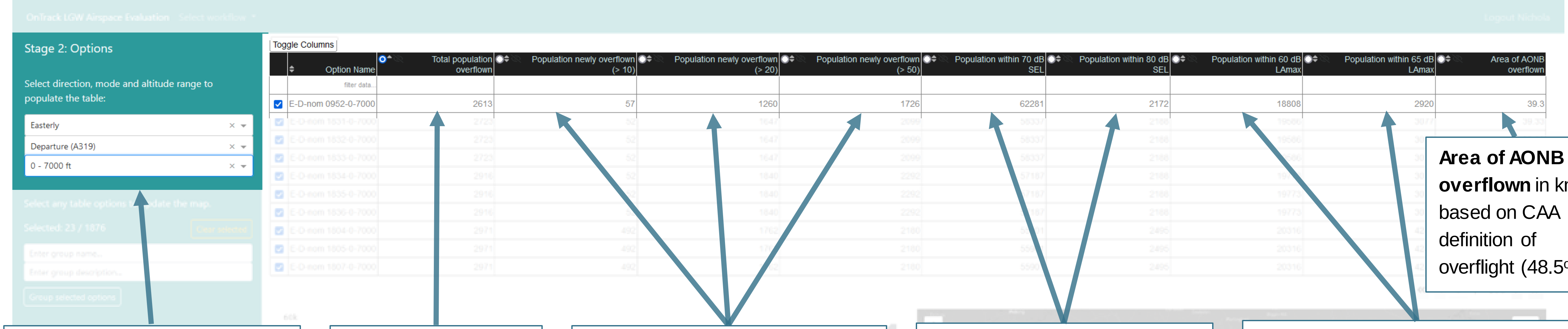
	Option Name	Total population overflown	Population newly overflown (> 10)	Population newly overflown (> 20)	Population newly overflown (> 50)	Population within 70 dB SEL	Population within 80 dB SEL	Population within 60 dB LAmax	Population within 65 dB LAmax	Area of AONB overflown
	filter data...									
☑	E-D-nom 0952-0-7000	2613	57	1260	1726	62281	2172	18808	2920	39.3
☑	E-D-nom 1831-0-7000	2723	52	1647	2099	58337	2188	19586	3077	39.33
☑	E-D-nom 1832-0-7000	2723	52	1647	2099	58337	2188	19586	3077	39.33
☑	E-D-nom 1833-0-7000	2723	52	1647	2099	58337	2188	19586	3077	39.33
☑	E-D-nom 1834-0-7000	2916	52	1840	2292	57187	2188	19773	3077	39.34
☑	E-D-nom 1835-0-7000	2916	52	1840	2292	57187	2188	19773	3077	39.34
☑	E-D-nom 1836-0-7000	2916	52	1840	2292	57187	2188	19773	3077	39.34
☑	E-D-nom 1804-0-7000	2971	492	1762	2180	55901	2495	20316	4240	39.3
☑	E-D-nom 1805-0-7000	2971	492	1762	2180	55901	2495	20316	4240	39.3
☑	E-D-nom 1807-0-7000	2971	492	1762	2180	55901	2495	20316	4240	39.3

Example only

1 / 188



4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS



Area of AONB overflown in km^2 based on CAA definition of overflight (48.5º)

The notional flight path data is initially filtered by:

- Direction (Easterlies or Westerlies),
- Mode (Arrivals or Departures), and
- Altitude range (0-4000ft and 0 – 7000ft).

Once selected, the table is populated with the corresponding notional flight path data.

Total population overflown

The database tells us the total number of population overflown.

This is calculated using an overflight contour which is based on the CAA's definition of overflight (48.5º cone).

Population newly overflown

The database tells us the number of people newly overflown where they are not already overflown at least 10, 20 or 50 times a day on average.

It uses overflight contours which are based on the CAA's definition of overflight (48.5º) and 2019[1] flight track data.

[1] Information within the database has been adjusted to reflect the extant route 4 procedure

Population with 70dB and 80dB SEL

The database calculates the number of people within the 70 dB and 80 dB Sound Exposure Level (SEL) contours.

The SEL data shows the population exposed above a certain level from a single noise event. They are an indicator of the primary metrics we will appraise later in the process (L_{Aeq} contours)

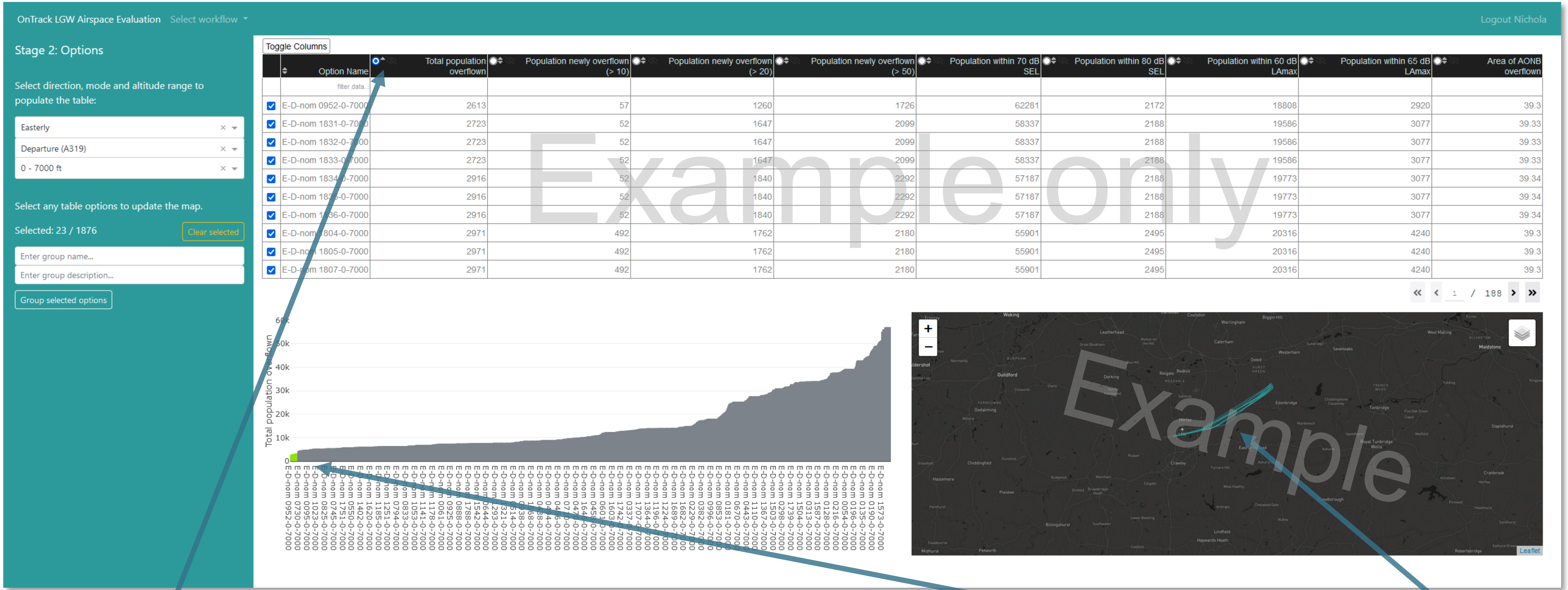
Population with 60dB LAmax and 65dB LAmax

The database calculates the number of people within the 60 dB and 65dB L_{Amax} contours.

L_{Amax} contours show the locations where the number of events exceed a pre-determined noise level.

These are an indication of secondary metrics used as part of the CAP1616 process.

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS



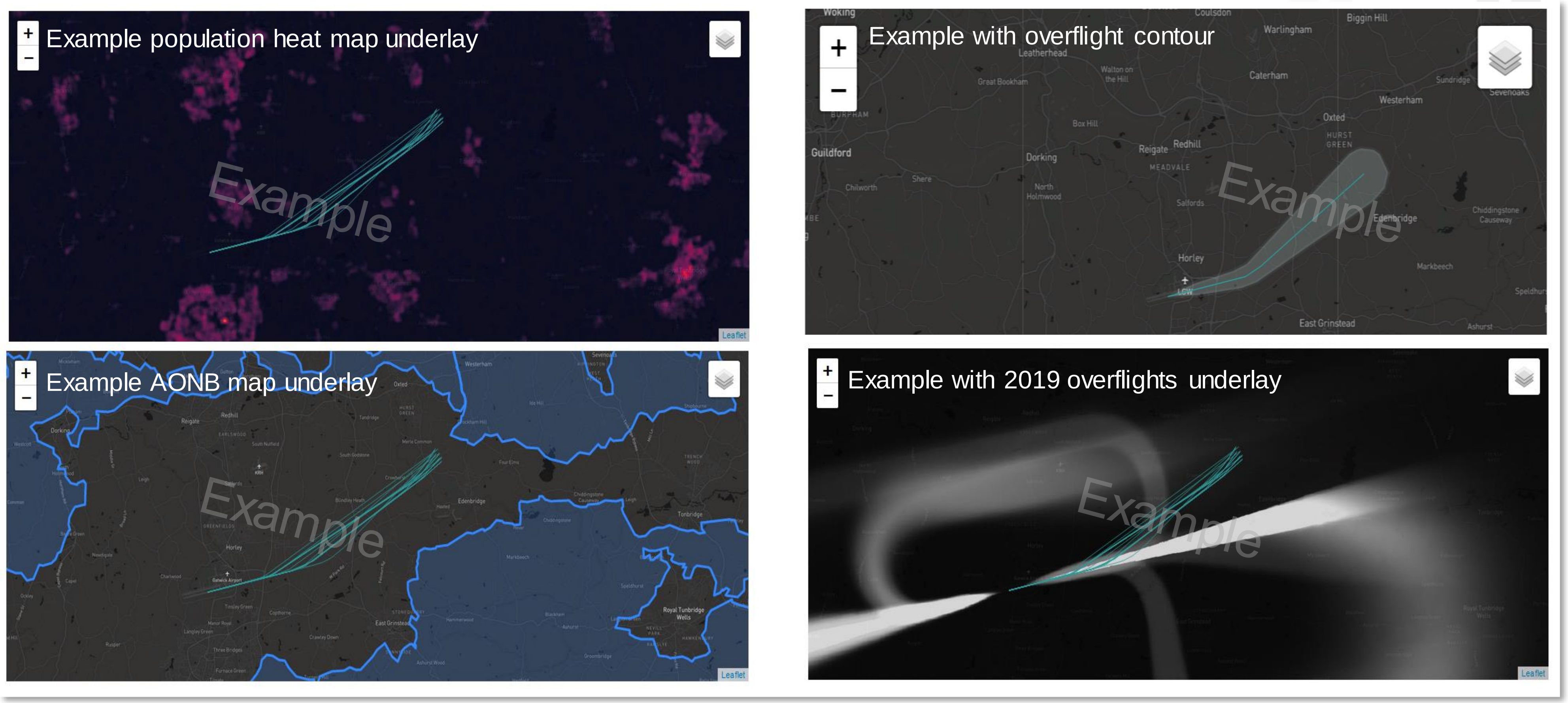
Metrics are sorted to identify high performing notional flight paths. This updates the table and the graph. Here we have ordered the data from low to high to identify the paths that overfly the lowest number of population.

Trends in performance are identified using the graph. Groups of notional flight paths can be selected to examine in further detail.

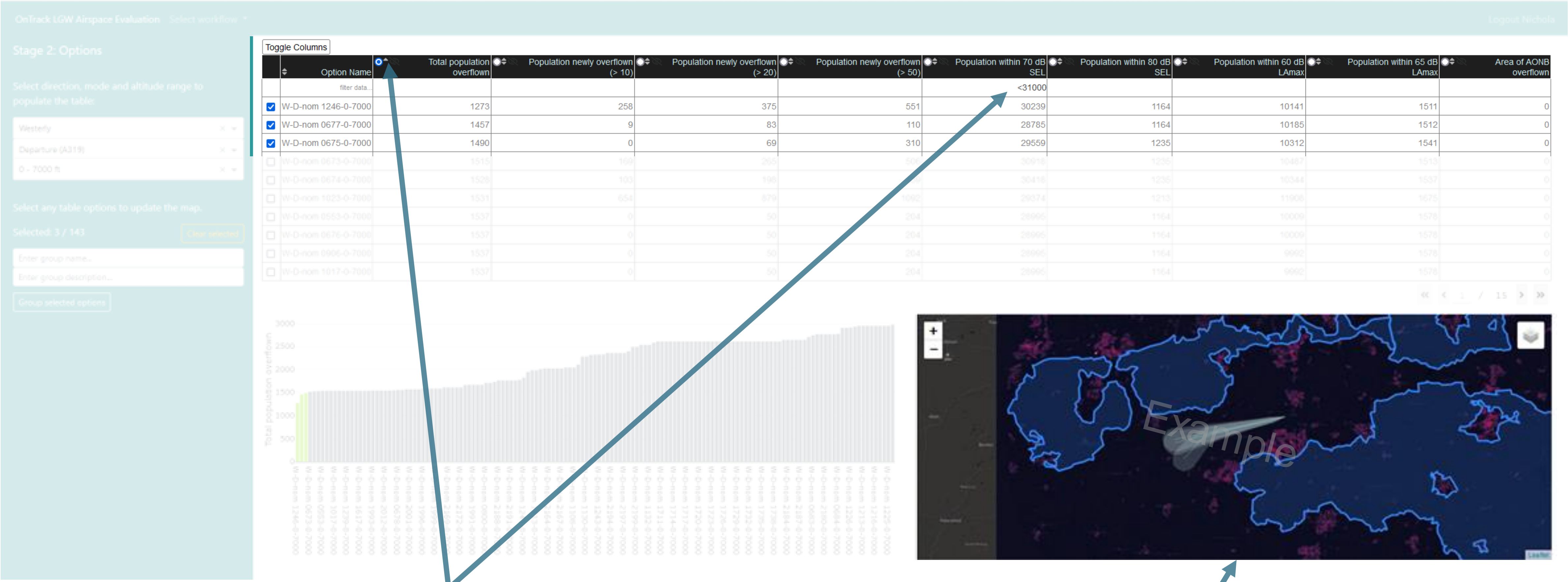
Selected notional flight paths are displayed on the map.

4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS

Map underlays aid analysis by displaying different information such as population heat maps, 2019 overflight and AONB locations. Flight path centerlines can also be selected to show the overflight contour. We have used these background maps to help develop the Comprehensive List of Options.



4. APPROACH TO DEVELOPING THE COMPREHENSIVE LIST OF OPTIONS



Multiple metrics can be used to filter the data in order to identify high performing notional flight paths that best meet our design principles. In this <u>example</u> the top ~150 paths for the 70dB SEL metric all have a population count of under 31,000 and the data has been filtered to only show these paths. They have then been sorted from low to high against the total population overflown metric, and the top three paths selected.

Maps and other data columns can be interrogated to test the overall performance of the notional flight paths. In this <u>example</u> we can see that the top three paths previously selected do not overfly the AONB shown in blue on the map.

FEEDBACK & QUESTIONS

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

We used the information in the database to identify the comparatively higher performing notional flight paths that align with the design principles and can be combined together into operationally feasible ‘systems’ of arrival and departure routes.

Each ‘option’ is one complete system of either arrival or departure routes from the same runway end. The comprehensive list of options is made up of:

- 10 easterly departure systems;
- 9 westerly departure systems;
- 10 easterly arrival systems; and
- 10 westerly arrival systems.

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

Developing options that align with our Design Principles

- Some design principles are inherent in all the notional flight paths, e.g. safety, enhanced navigational performance.
- Others can be evaluated when the systems are developed, e.g. resilience, deconfliction by design and locally tailored designs.
- We must look at the performance of the individual notional flight paths in the database to maintain alignment with the principles for noise and flight efficiency

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

We therefore needed to use the Airspace Design Database to identify high performing notional flight paths that best meet DP3, DP6 and DP7.

#	Design Principle	Outcome
1	Safety by Design – Core	Inherent in all options developed
2	Enhanced Navigation Standards – Core	Inherent in all options developed
3	Limit Adverse Noise Effects – Core	Specific flight paths need to be identified in order to meet the design principle
4	Time Based Arrival Operations	Inherent in all arrival options developed
5	Resilience Built In	The design principle can be considered as part of system development
6	Optimise Use of Aircraft Capabilities	Specific flight paths need to be identified in order to meet the design principle
7	Long Term Predictability & Adaptability	Specific flight paths need to be identified in order to meet the design principle
8	Deconfliction by Design	The design principle can be considered as part of system development
9	Locally Tailored Designs	The design principle can be considered as part of system development

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

There are several other important considerations that we must take into account when developing the options.

Consideration	Description
Noise	Our Airspace Design database contains metrics to create options that minimise the total population overflown, and options that minimise the population newly overflown as per our commitment to stakeholders.
Climb profiles	We've combined the outputs of the database, which uses the most common continuous climb profiles operated at Gatwick, with other map data on population and overflight, to consider the impacts of lower slower aircraft when developing options.
Capacity	To meet our Statement of Need and the AMS, we need a minimum of 3 departure paths that are sufficiently separated, to meet capacity and efficiency in the airspace. We may have to revisit this in future once further information is known about the airspace network above 7000ft.
Departure Separation	In order to achieve safety, capacity and efficiency, we need to ensure that departure routes are sufficiently laterally separated. An example of departure separation, and further details, are shown later in the presentation.
Efficiency and Track Mileage	To develop efficient routes that minimise track miles, we need to know where aircraft are routing above 7000ft. This forms part of a NATS NERL ACP. At this stage, we don't yet have any details around the upper airspace network in order to understand how we can develop efficient routes so as a starting point when developing options, we've used the existing Flight Information Region (FIR) entry/exit points as these are unlikely to change.
Northern Runway	All notional flight paths developed and all the departure options presented today are applicable to both the northern and southern runways.

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

In summary, we needed to develop systems that use the outputs of the airspace design database to meet DP3, DP6 and DP7. These systems also needed to meet our other Design Principles and offer a minimum of 3 departure paths that are sufficiently separated, to meet capacity and efficiency in the airspace.

To ensure we used the database outputs to build options that meet of the design principles and our statement of need, we followed the following matrix. As part of our comprehensive list of options pack, we will provide a more detailed version of this matrix which outlines the metrics used when building each option.

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Minimise total population overflown	✓ Options developed aim to also meet DP1 DP5 and DP8 DP9	✓ Options developed aim to also meet DP1 DP3 DP5 and DP8	✓ Options developed aim to also meet DP1 DP3 DP5 DP8 and DP9
Minimise population newly overflown	✓ Options developed aim to also meet DP1 DP5 and DP8 DP9	✓ Options developed aim to also meet DP1 DP3 DP5 and DP8	✓ Options developed aim to also meet DP1 DP3 DP5 DP8 and DP9

(DP2 is inherent in all options and DP4 is inherent to all arrivals options)

Over the next slides we'll show you a working example of how we have developed our first option: Easterly Departure option A (EDA). Using the matrix, this means we're going to focus on minimising total population overflown, and DP3 Limit Adverse Noise Effects.

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

Identify High Performing Notional Flight Paths

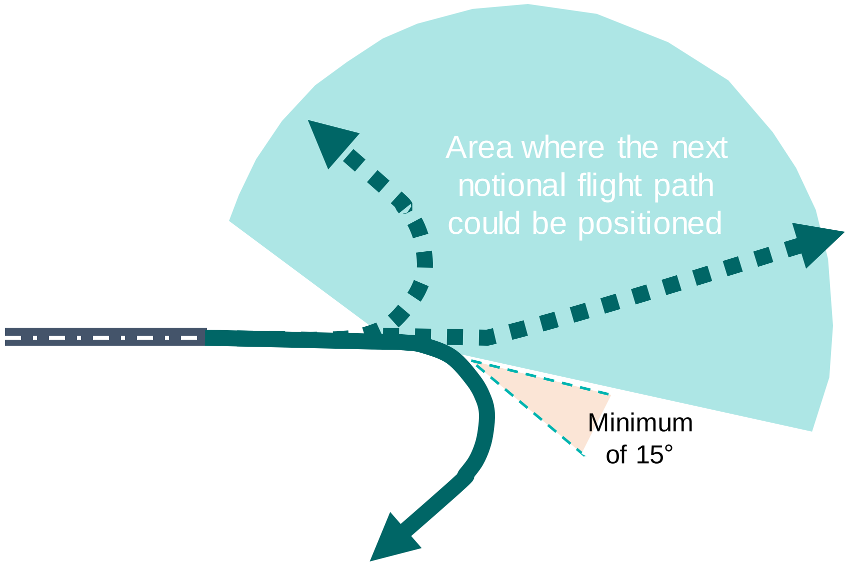
As we're focusing on minimising total population overflown and limiting adverse noise effects, we've looked at the following metrics in the database:

- Population within the 70dB SEL contour
- Total population overflown

Once we've established a group of high performing flight paths, we then check these against other noise metrics, e.g. impact on AONBs, to find the paths that performs well overall. This gives us our first track.

Next we need to find other high performing notional flight paths that provide sufficient separation from track 1. This ensures that the system we develop is safe and can meet current and future capacity and therefore meet our Statement of Need and the Airspace Modernisation Strategy (AMS).

The illustration shows a simplified diagram of departure separation.



5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

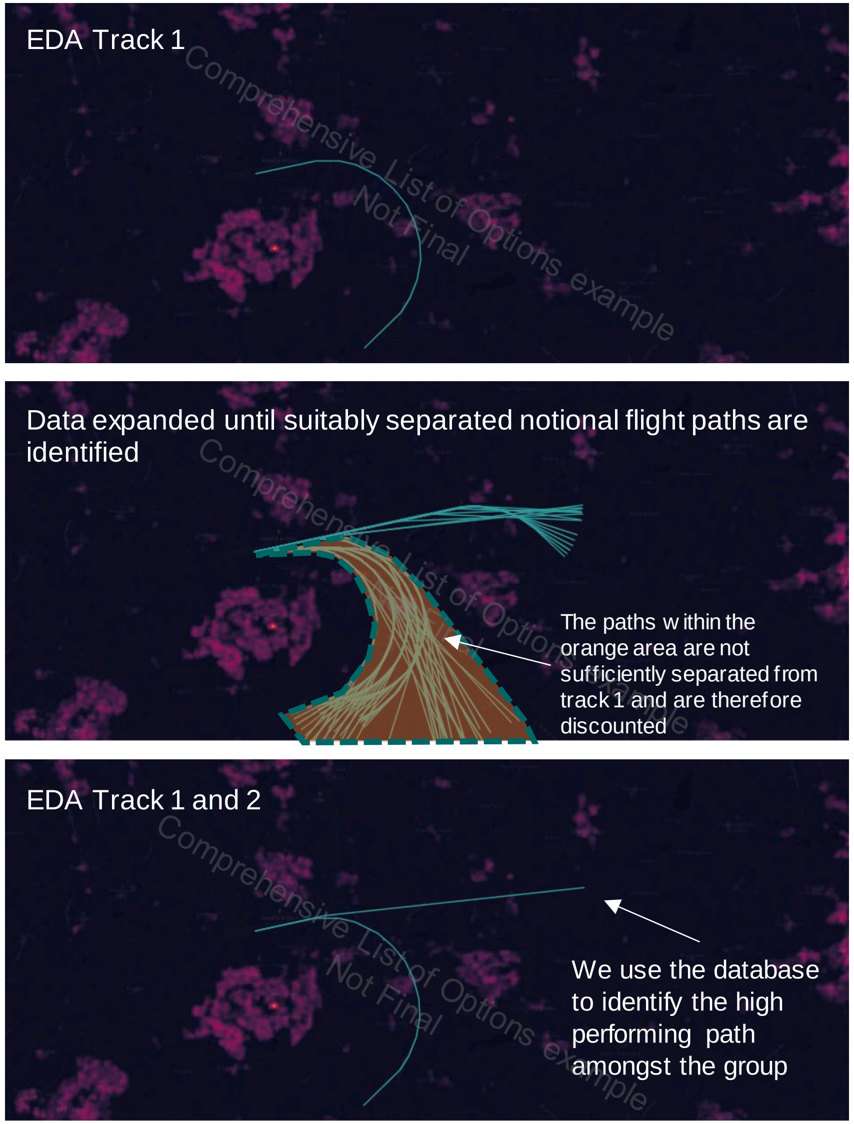
1. Identify High Performing Notional Flight Paths

To find the second track that is sufficiently separated, we use the same metrics as track 1 however we open the data up to find a wider group of high performing notional flight paths.

We continue to open up the data until we identify paths that have greater than 15° separation from the first track.

As before, we then take the group and check these against some of the other noise metrics to find a path that performs well overall. This gives us our second track.

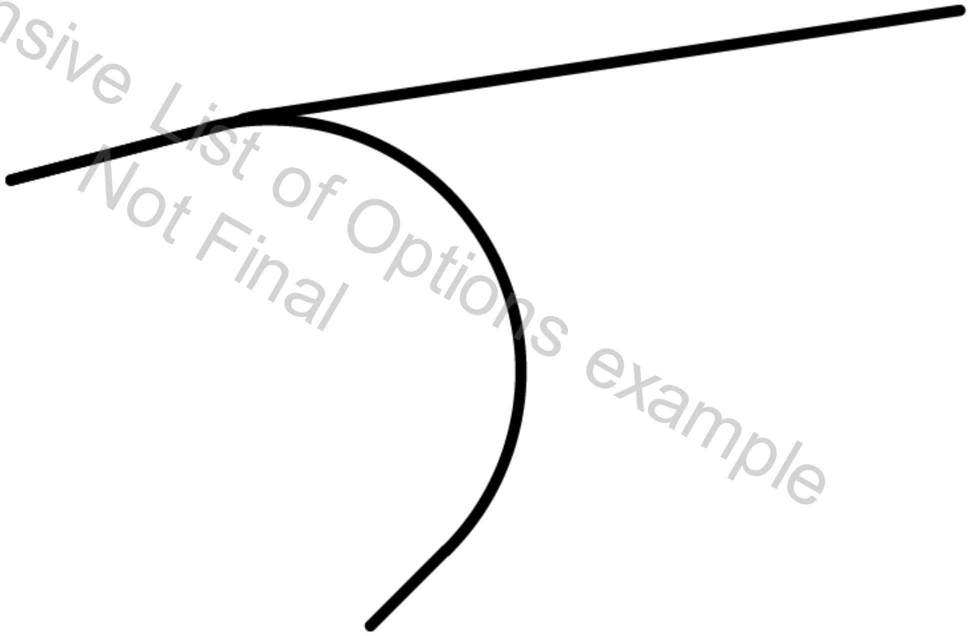
The process is then repeated to identify the third track.



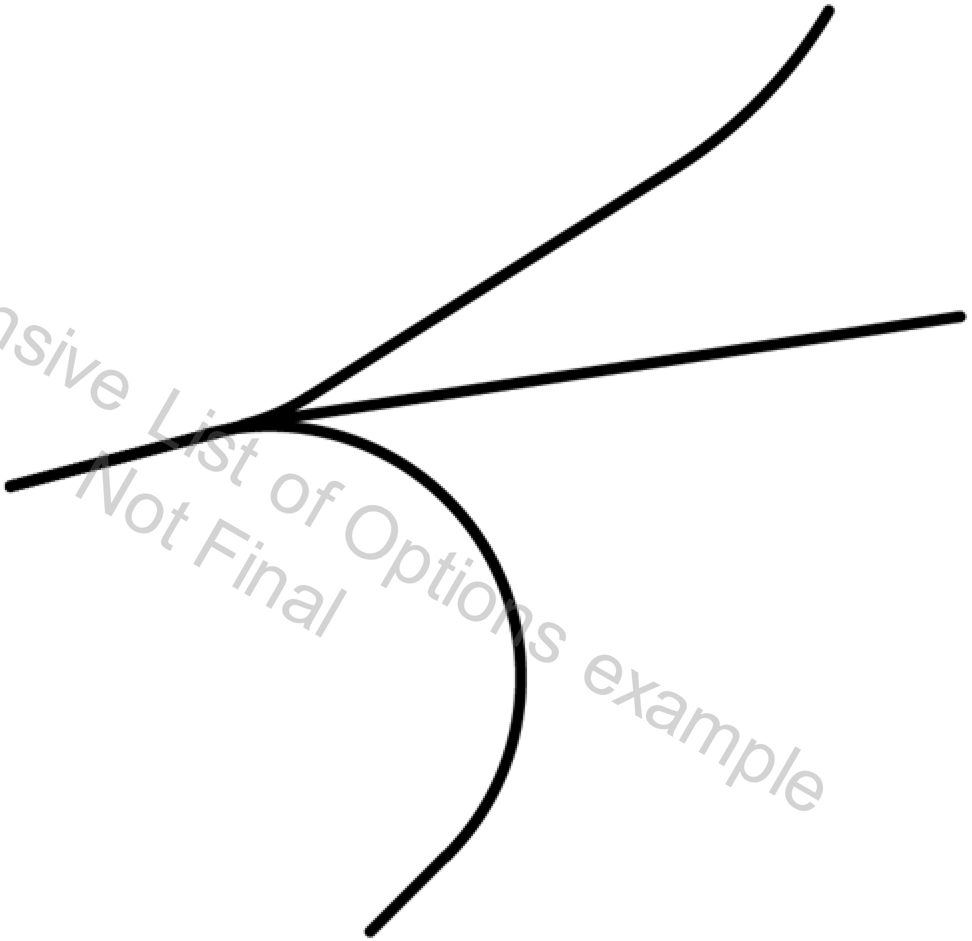
Where the data has led us to develop options with less than 30° separation between departure tracks, we have also developed alternative options with greater than 30° separation

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW – EXAMPLE 1

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW – EXAMPLE 1



5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW – EXAMPLE 1



5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

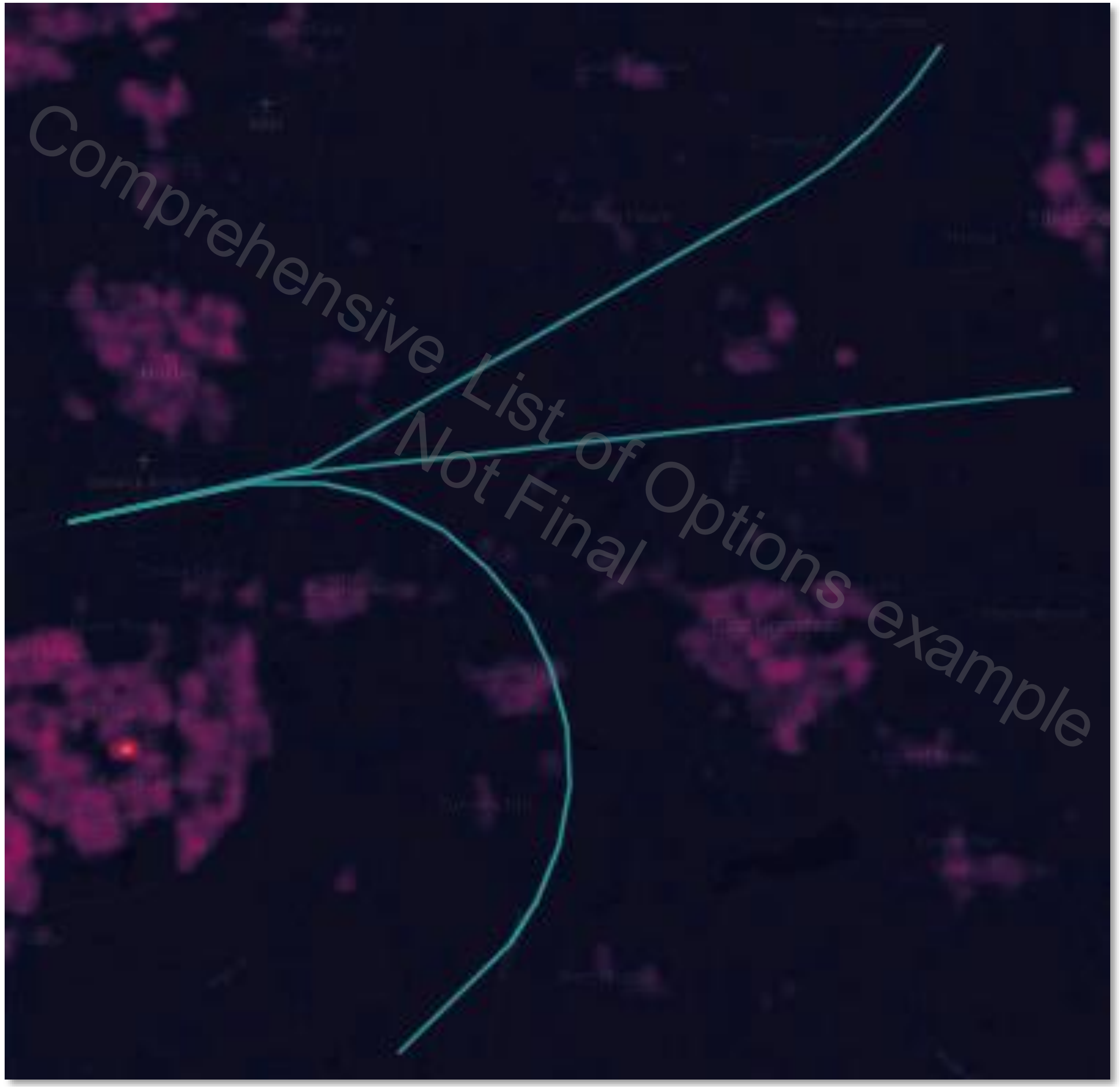
Now that we have the output of the database, we finalise the option by considering lower climb profiles and possible network exit points, using population, overflight and AONB map data. We also check whether the option meets our other Design Principles we're aiming to achieve.

We then go back to our options development matrix to build the next option:

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Minimise total population overflown	✓ Options developed aim to also meet DP1 DP5 and DP8	✓ Options developed aim to also meet DP1 DP5 and DP8	✓ Options developed aim to also meet DP1 DP5 DP8 and DP9
Minimise population newly overflown	✓ Options developed aim to also meet DP1 DP5 and DP8	✓ Options developed aim to also meet DP1 DP5 and DP8	✓ Options developed aim to also meet DP1 DP5 DP8 and DP9

This is repeated until we have our comprehensive list.

- Options that aim to meet DP6 apply noise metrics from the database between 0-4000ft and then route directly to the network exit points to minimise track miles; we will use map data to make small adjustments to the tracks between 4-7000ft to consider noise impacts.
- Options that aim to meet DP7 use the database outputs to identify potential respite alternatives.



5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

- The system options we are presenting have been developed with a focus on noise and environmental data. We haven't considered connectivity with the upper airspace network, other airports, and how the departure options and arrival options might interact (this is dependent on the airspace above 7000ft).
- As part of this round of engagement, we will be engaging with airspace users, NATS and our neighbouring airports to understand how we will need to develop and refine the options in order to integrate with the wider airspace arrangements in London and the Southeast.
- **It's therefore important to note that these options will evolve as we progress through the process as more information becomes available.**
- We will carefully document the evolution of the options from the information presented in this round of engagement onwards to track what information has influenced which changes in a transparent way.

FEEDBACK AND QUESTIONS

5. COMPREHENSIVE LIST OF OPTIONS OVERVIEW

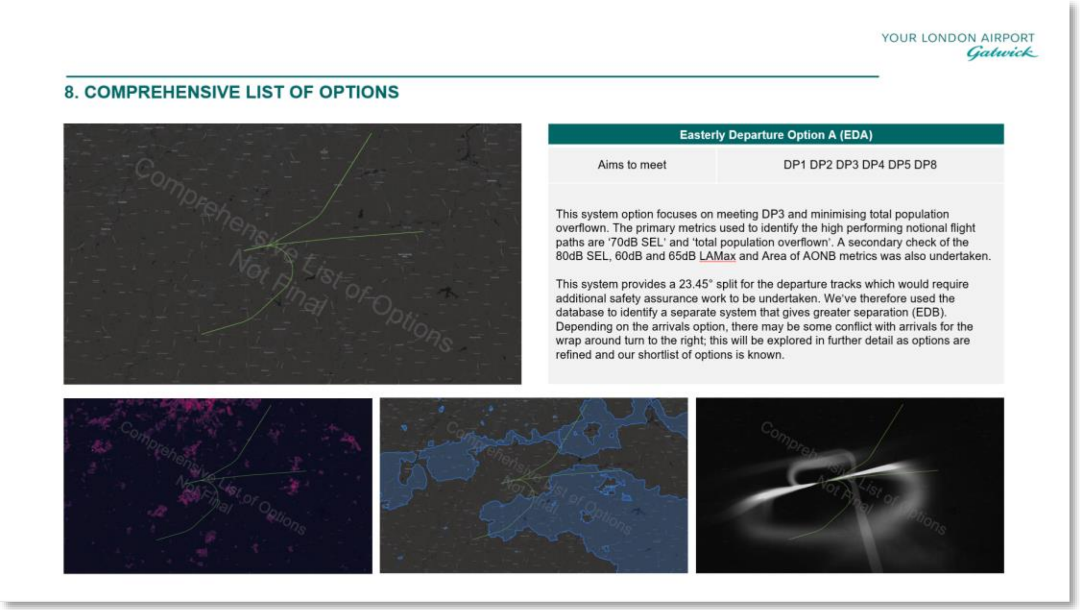
Understanding our Comprehensive List of Options

The comprehensive list is split into four sections; easterly departures, westerly departures, easterly arrivals and westerly arrivals.

Each section starts with an overview of the matrix used to develop the options. This details what each option aims to achieve, and the metrics from the Airspace Design Database used to help develop the option:

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Airspace Design Database Outputs	The airspace design shall aim to **limit and where possible reduce the adverse impacts of aircraft noise**	The airspace design should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance	Airspace design should offer long term predictability of flight paths and respite options and offer adaptation for the future airport development scenarios outlined in our draft Masterplan
Minimise total population overflown 70dB SEL and total population overflown. Checked against 80dB SEL, 60dB and 65dB L_{AMax}, Area of AONB	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed within respite options using database outputs and the systems already developed for DP3. Respite options include SIDs for different periods (e.g. alternative days using different groups) or different periods of the day (e.g a set of SIDs for day and night) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Easterly Departure Option A (EDA) **Easterly Departure Option B (EDB)** **Easterly Departure Option G (EDG)**	**Easterly Departure Option C (EDC)** **Easterly Departure Option D (EDD)**	**Easterly Departure Option E (EDE)** **Easterly Departure Option F (EDF)**
Minimise population newly overflown Population newly overflown >10, Population newly overflown >20, Population newly overflown >50.	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using existing NPRs and database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed with respite options using database outputs. Respite options include SIDs for different periods (e.g. alternative days using different groups) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Easterly Departure Option H (EDH)	**Easterly Departure Option I (EDI)**	**Easterly Departure Option J (EDJ)**

DP2 and DP4 are inherent in all notional flight paths developed



Each option is then shown on a page with various background maps to aid with answering our engagement questions. The final page of each section includes a map which shows all off the options overlaid together. The options are shown up to 7000ft.

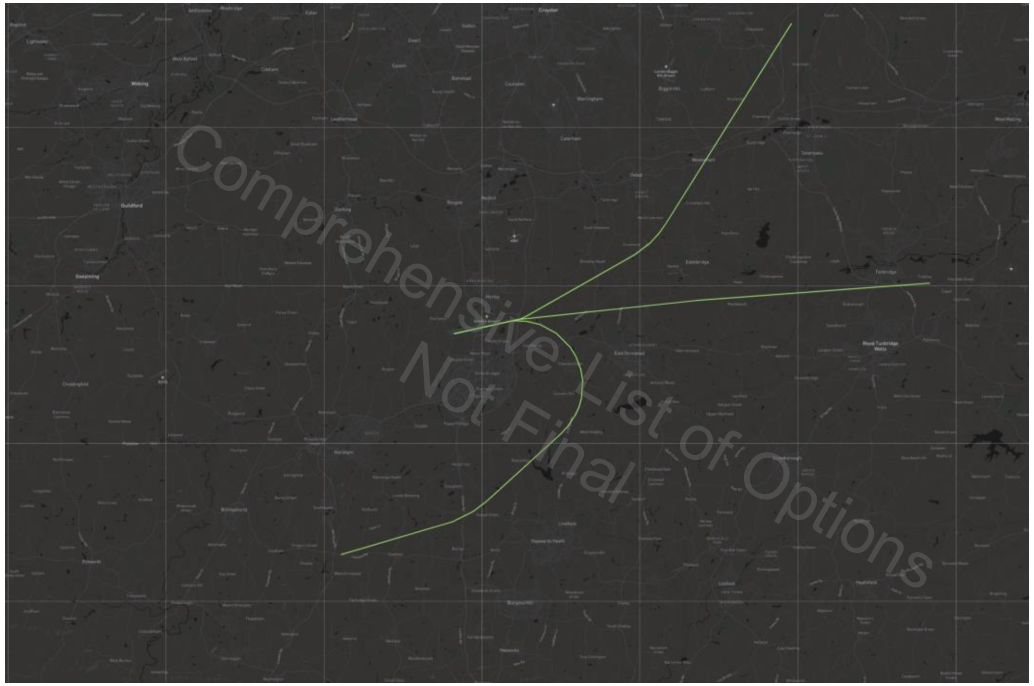
Easterly Departures

Options Development: Design Principles (Departures)

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Airspace Design Database Outputs	The airspace design shall aim to **limit and where possible reduce the adverse impacts of aircraft noise**	The airspace design should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance	Airspace design should offer long term predictability of flight paths and respite and offer adaptation for the future airport development scenarios outlined in our draft Masterplan
Minimise total population overflown 70dB SEL and total population overflown. Checked against 80dB SEL, 60dB and 65dB L_{AMax}, Area of AONB	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed within respite options using database outputs and the systems already developed for DP3. Respite options include SIDs for different periods (e.g. alternative days using different groups) or different periods of the day (e.g a set of SIDs for day and night) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Easterly Departure Option A (EDA) **Easterly Departure Option B (EDB)** **Easterly Departure Option G (EDG)**	**Easterly Departure Option C (EDC)** **Easterly Departure Option D (EDD)**	**Easterly Departure Option E (EDE)** **Easterly Departure Option F (EDF)**
Minimise population newly overflown Population newly overflown >10, Population newly overflown >20, Population newly overflown >50.	System options developed using existing NPRs and SID centrelines for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using existing NPRs and database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed with respite options using database outputs. Respite options include SIDs for different periods (e.g. alternative days using different groups) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Easterly Departure Option H (EDH)	**Easterly Departure Option I (EDI)**	**Easterly Departure Option J (EDJ)**

DP2 and DP4 are inherent in all notional flight paths developed

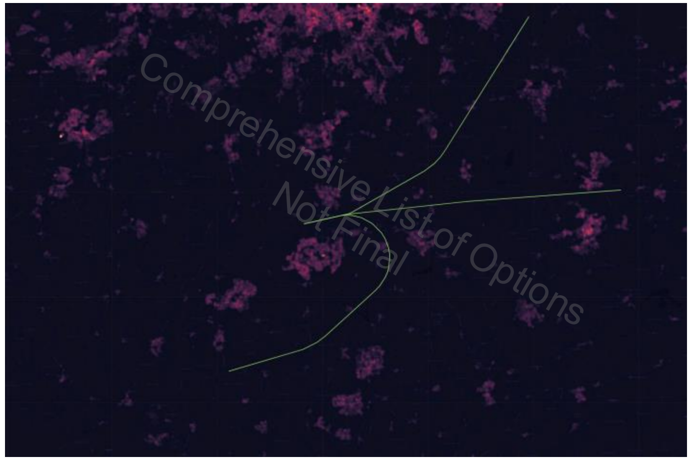
8. COMPREHENSIVE LIST OF OPTIONS

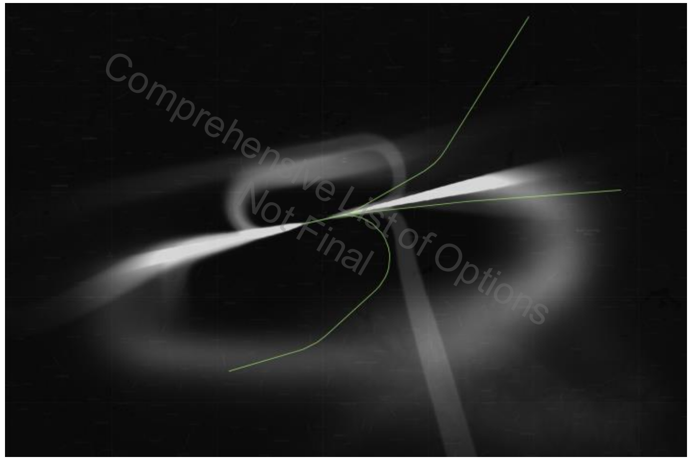


Easterly Departure Option A (EDA)	
Aims to meet	DP1 DP2 DP3 DP5 DP8 DP9

This system option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown. The primary metrics used to identify the high performing notional flight paths are ‘70dB SEL’ and ‘total population overflown’. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

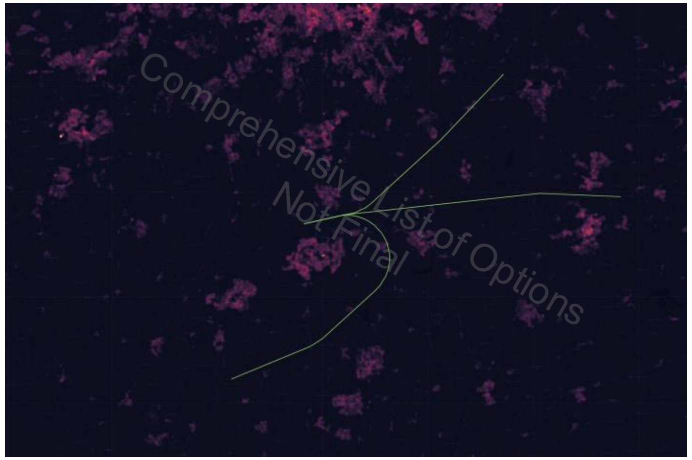
This system provides a 23.45° split for the departure tracks which would require additional safety assurance work to be undertaken. We’ve therefore used the database to identify a separate system using the same metrics that gives greater separation (EDB). Depending on the arrivals option, there may be some conflict with arrivals for the wrap around turn to the right; this will be explored in further detail as options are refined and our shortlist of options is known.

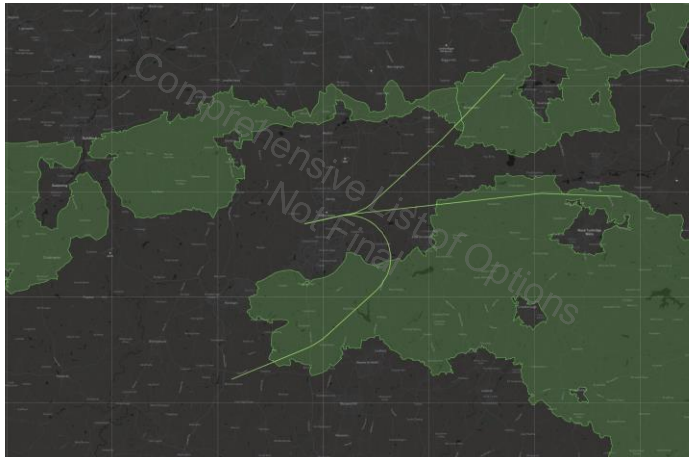


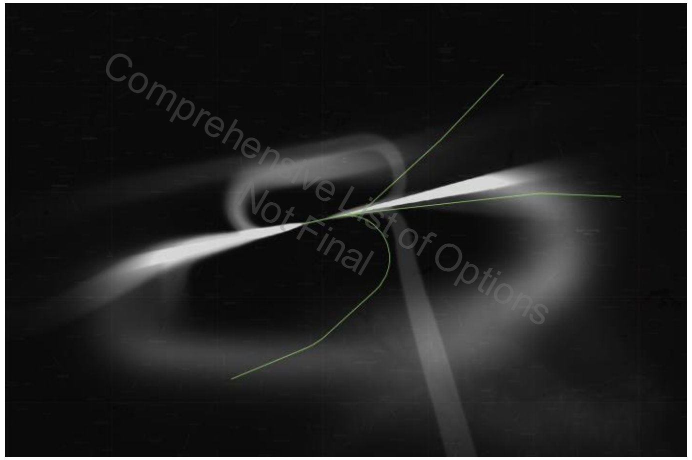


8. COMPREHENSIVE LIST OF OPTIONS

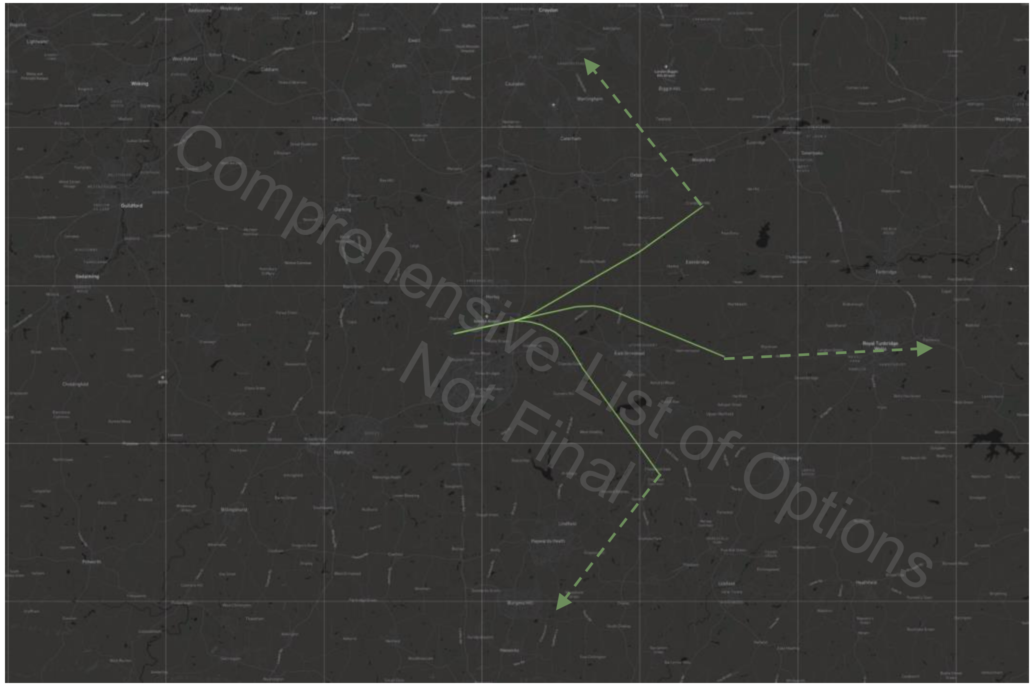
Easterly Departure Option B (EDB)	
Aims to meet	DP1 DP2 DP3 DP5 DP8 DP9
This option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown, whilst providing a greater level of departure separation than EDA. The primary metrics used to identify the high performing notional flight paths are '70dB SEL' and 'total population overflown'. A secondary check of the 80dB SEL, 60dB and 65dB L_{AMax} and Area of AONB metrics was also undertaken. The paths turning right and straight ahead are identical to EDA as there is sufficient separation between these. We have then identified a high performing path that has greater than 30° separation from the straight ahead track. Depending on the arrivals option, there may be some conflict with arrivals for the wrap around turn to the right; this will be explored in further detail as options are refined and our shortlist of options is known.	







8. COMPREHENSIVE LIST OF OPTIONS



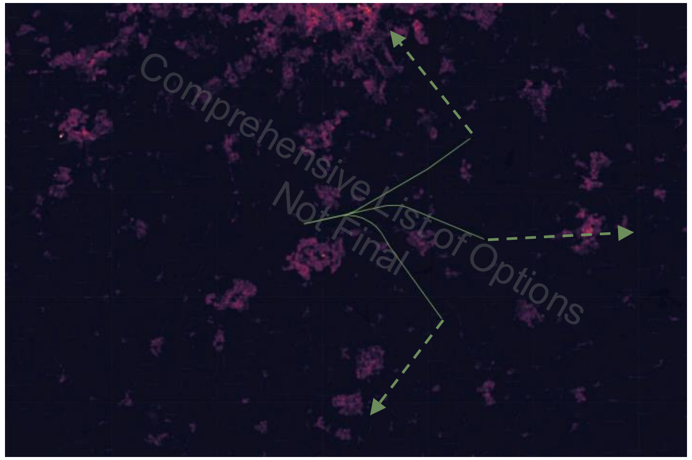
Easterly Departure Option C (EDC)	
Aims to meet Design Principles	DP1 DP2 DP3 DP5 DP6 DP8 DP9

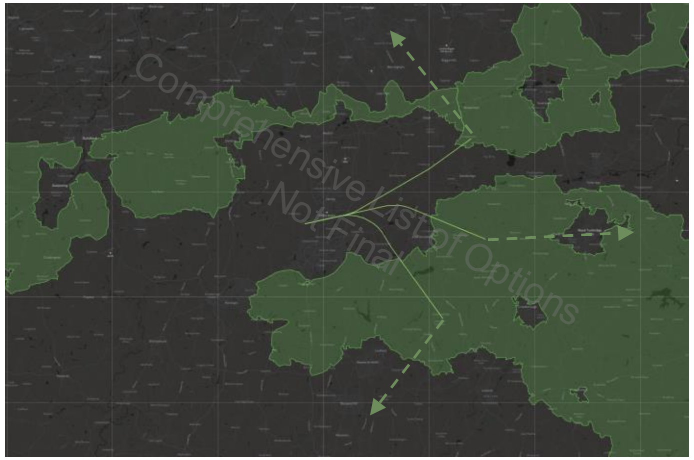
This system option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising total population overflown.

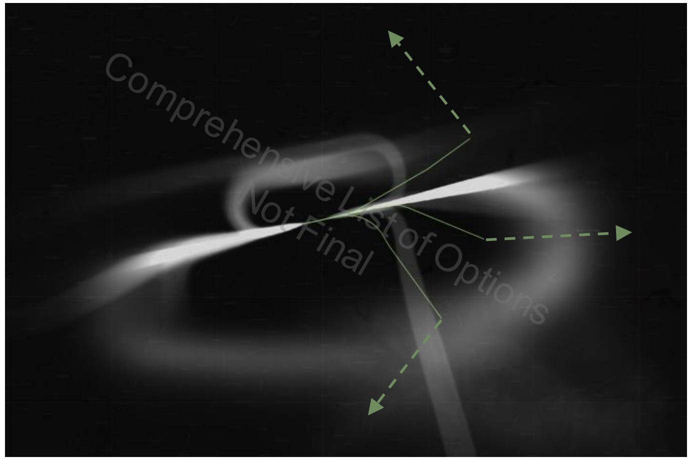
To first meet DP3, we have identified the high performing notional flight paths using the ‘70dB SEL’ and ‘total population overflown’ metrics for the paths between 0-4000ft. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

To achieve the aims of DP6, from 4000ft the option will then route directly to the network exit point (green dashed lines). This will evolve as more information around the airspace above 7000ft is shared from NERL.

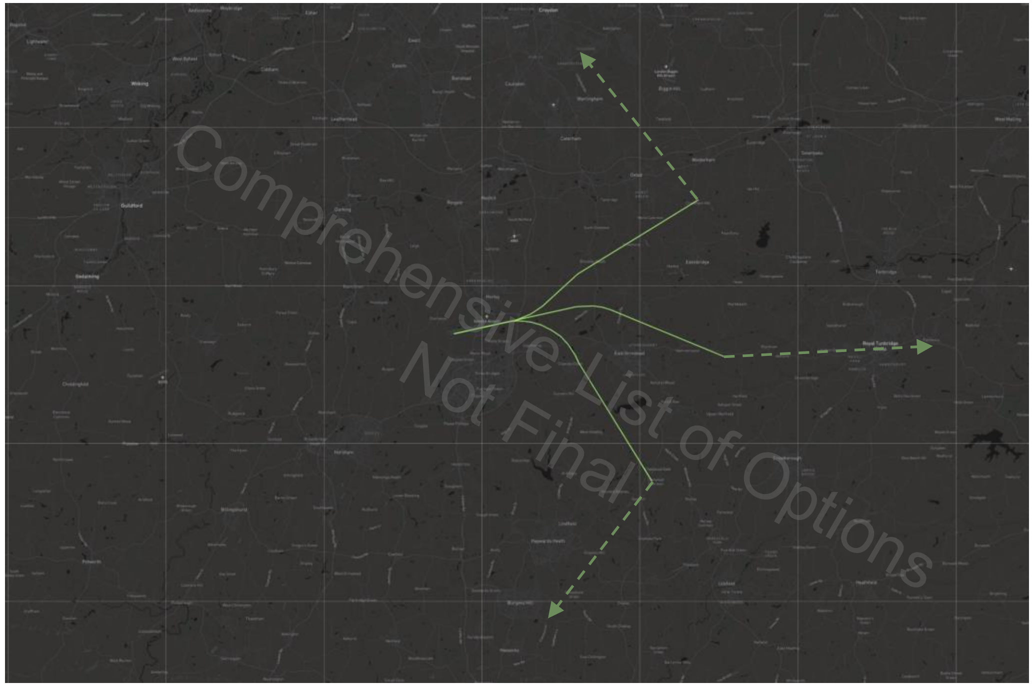
This system provides a 17.43° split for the departure tracks which would require additional safety assurance work to be undertaken. We’ve therefore used the database to identify a separate system that gives greater separation (EDD).







8. COMPREHENSIVE LIST OF OPTIONS

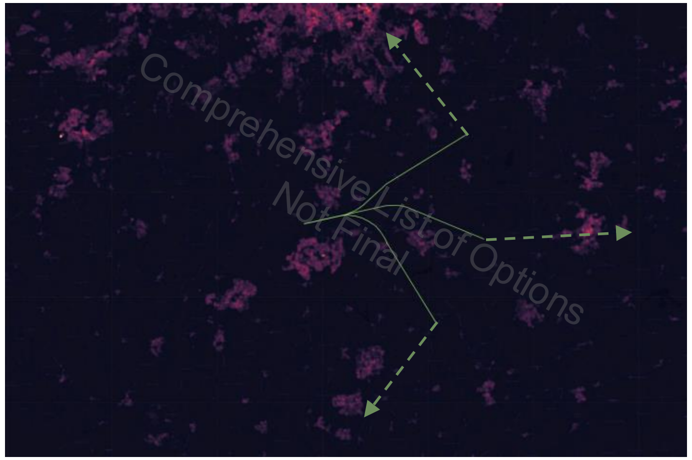


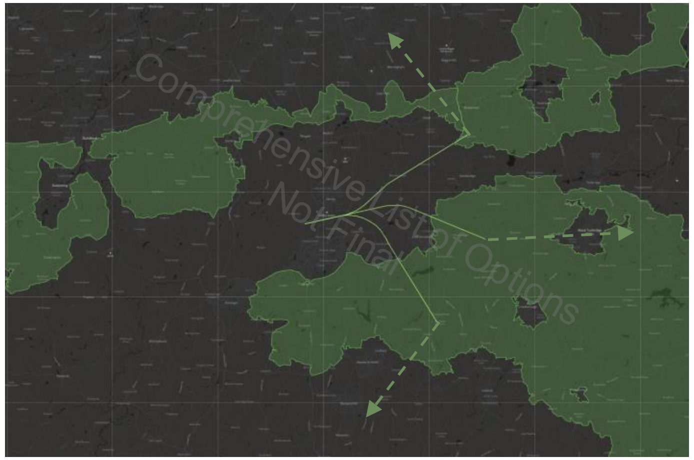
Easterly Departure Option D (EDD)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP6 DP8

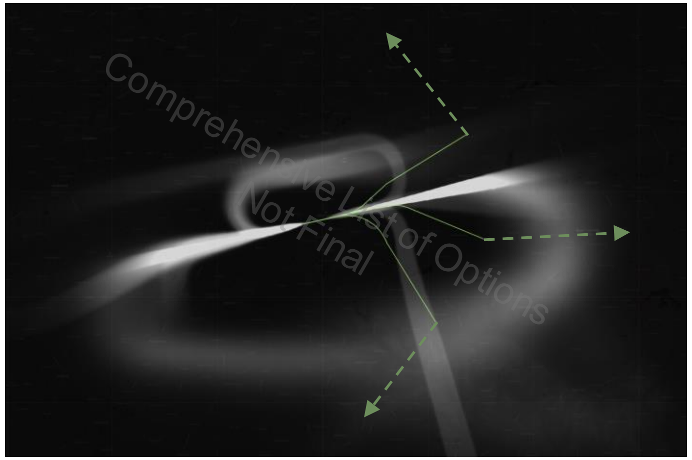
This system option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising total population overflown whilst providing a greater level of departure separation than EDC.

From 0-4000ft, the same metrics as EDC have been used to identify high performing notional flight paths that have greater than 30º separation.

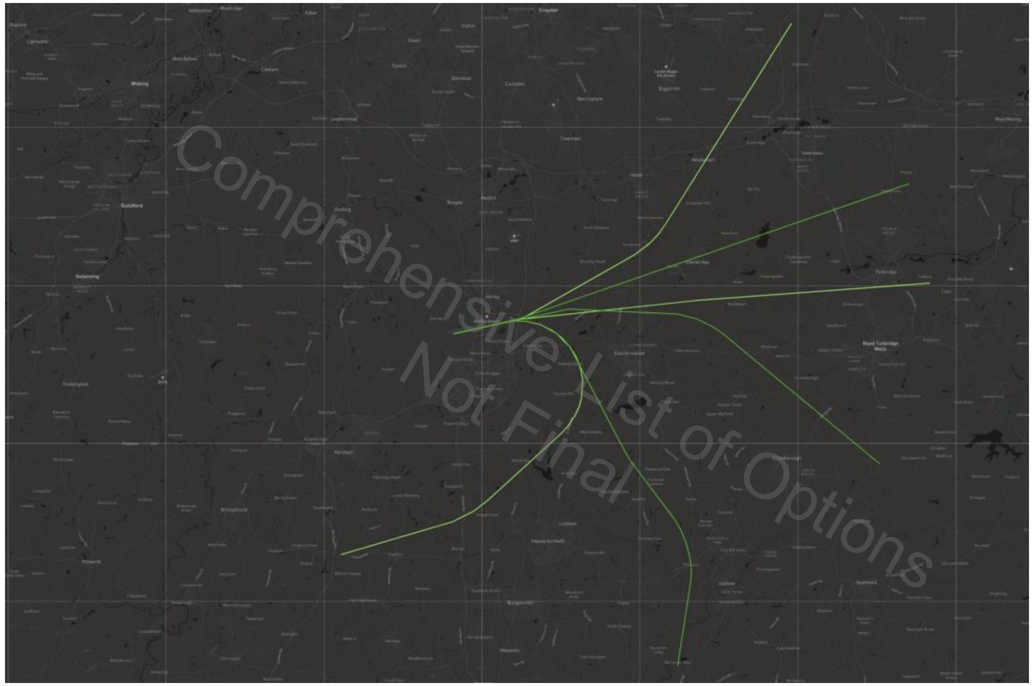
To achieve the aims of DP6, from 4000ft the option will then route directly to the network exit point (green dashed lines). This will evolve as more information around the airspace above 7000ft is shared from NERL.







8. COMPREHENSIVE LIST OF OPTIONS



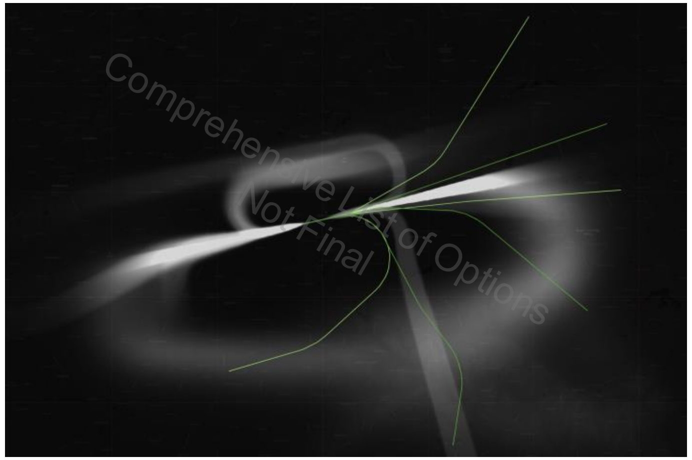
Easterly Departure Option E (EDE)	
Aims to meet	DP1 DP2 DP3 DP5 DP7 DP8 DP9

This system option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimising total population overflown.

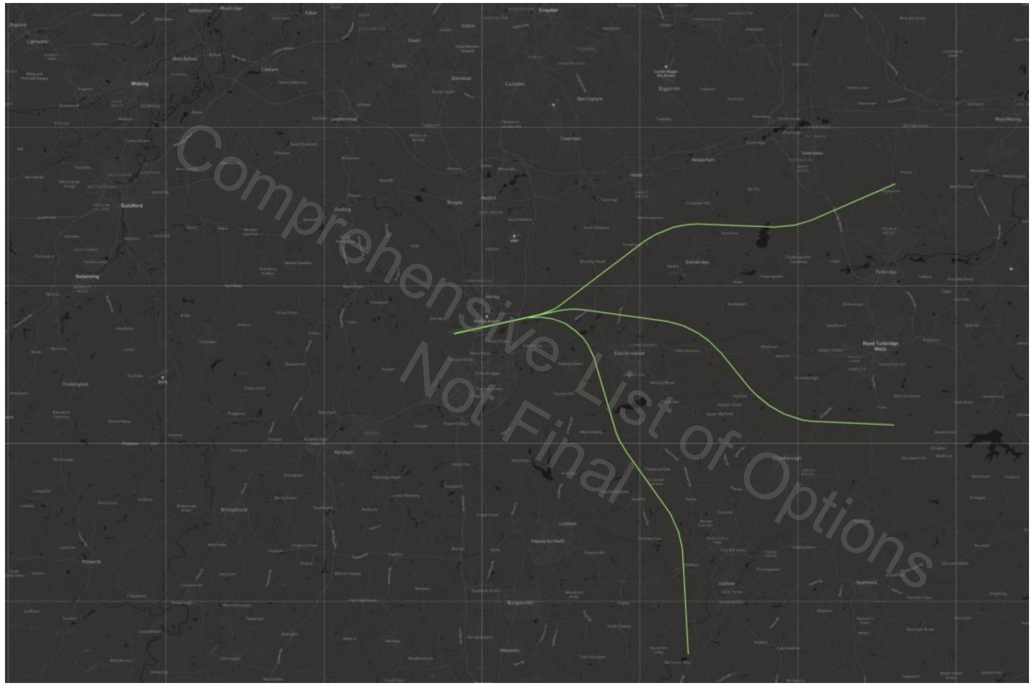
We've built upon EDA (Light green) and identified tracks that offer respite (dark green). The primary metrics used to identify the high performing notional flight paths are '70dB SEL' and 'total population overflown'. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

The set of light green tracks would be used for respite period 1, and the dark green tracks would be use for respite period 2.

Depending on the arrivals option, there may be some conflict with arrivals for the wrap around turn to the right; this will be explored in further detail as options are refined and our shortlist of options is known.



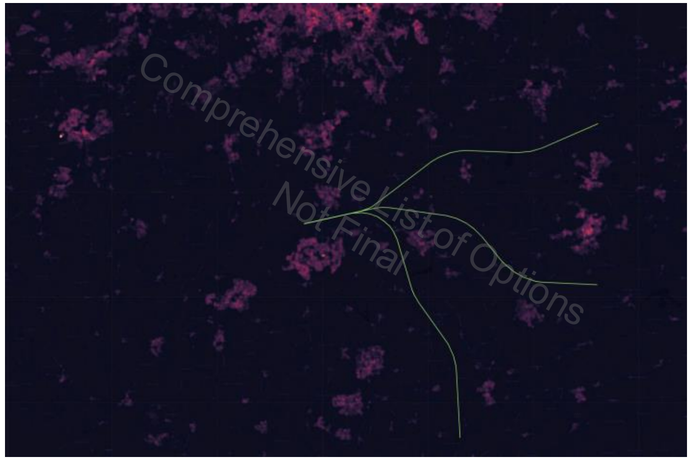
8. COMPREHENSIVE LIST OF OPTIONS

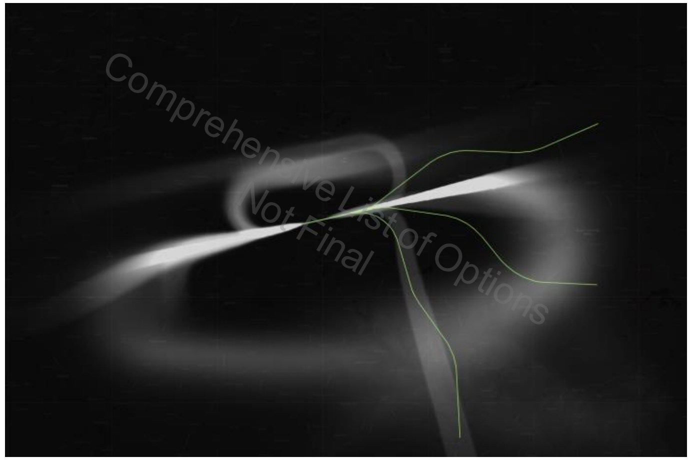


Easterly Departure Option F (EDF)	
Aims to meet	DP1 DP2 DP3 DP5 DP7 DP8 DP9

This system has been developed as a respite option that could be operated during the night. It could be combined with any EDA, EDB, EDC, EDD. Depending on its overall performance which we'll explore later in the process, this system could also be used during the day although the metrics used to develop it are targeted at the night time period.

The primary metrics used to identify the high performing notional flight paths are '80dB SEL' and 'total population overflown'. A secondary check of the 65dB LAMax was also undertaken.





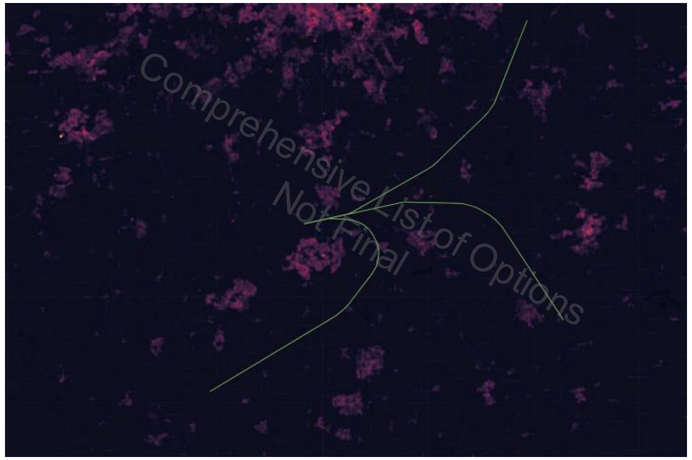
8. COMPREHENSIVE LIST OF OPTIONS

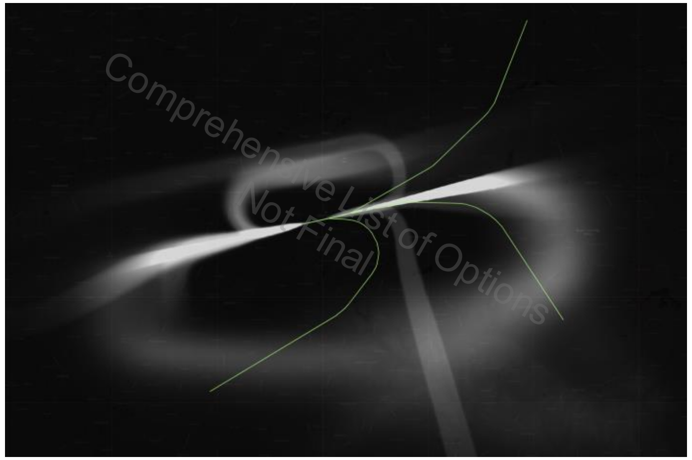
Easterly Departure Option G (EDG)	
Aims to meet	DP1 DP2 DP3 DP5 DP6 DP7 DP8 DP9

This system option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown. Although this system option complies with current regulations and conforms to current technological capability, it includes offset departures and turns shortly after take-off, both of which sit close to the defined regulatory limits. Therefore, this system so will only be taken forward if a considerable benefit can be determined.

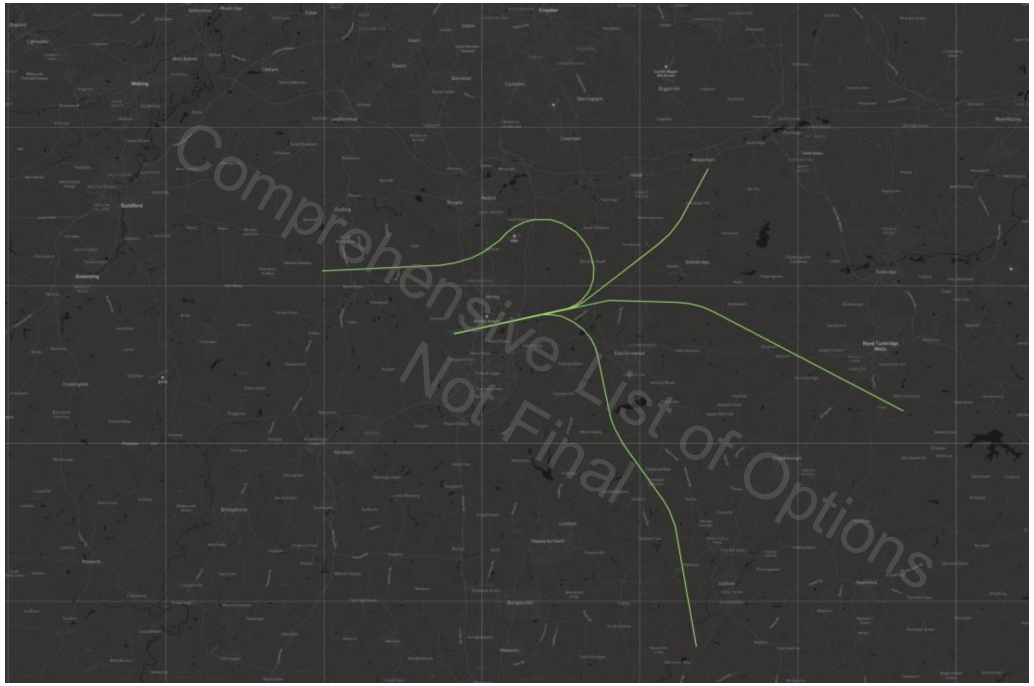
The primary metrics used to identify the high performing notional flight paths are '70dB SEL' and 'total population overflown'. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

Depending on the arrivals option, there may be some conflict with arrivals for the wrap around turn to the right; this will be explored in further detail as options are refined and our shortlist of options is known.



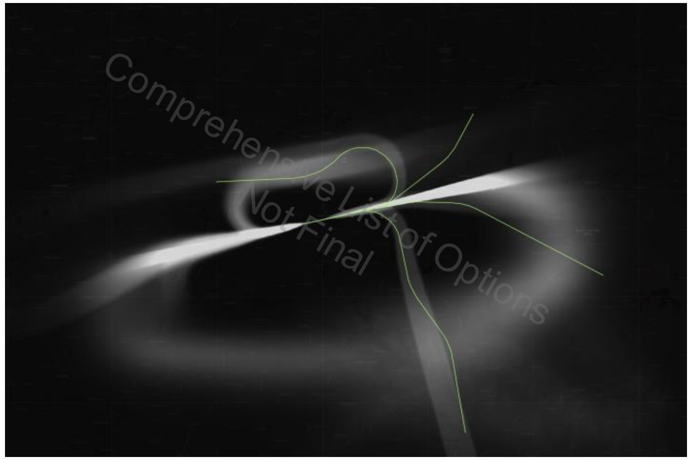


8. COMPREHENSIVE LIST OF OPTIONS

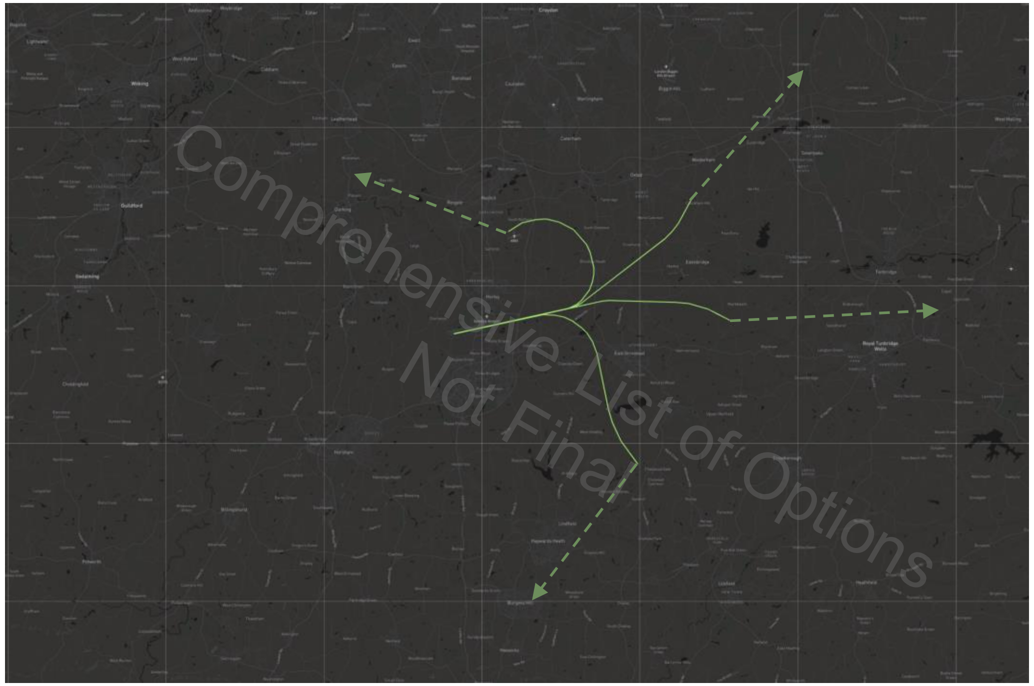


Easterly Departure Option H (EDH)	
Aims to meet	DP1 DP2 DP3 DP5 DP6 DP8 DP9

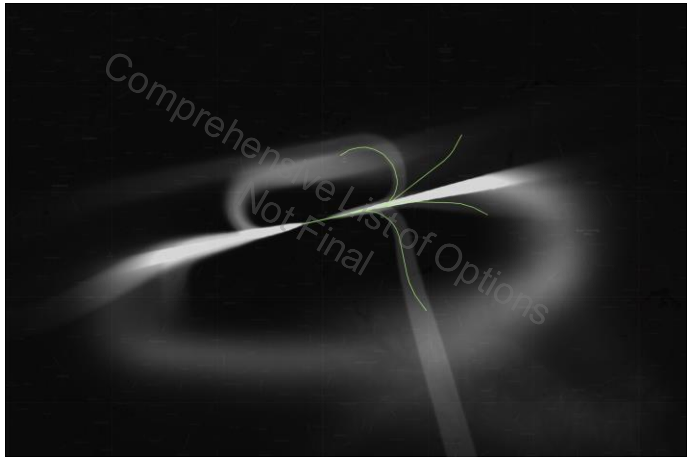
This system option focuses on meeting DP3 (limit adverse noise effects) and minimising population newly overflown. It is based on the existing nominal centrelines of the departure routes departing from Gatwick (including NPRs) however the vertical performance of these routes has been updated to reflect continuous climb performance.



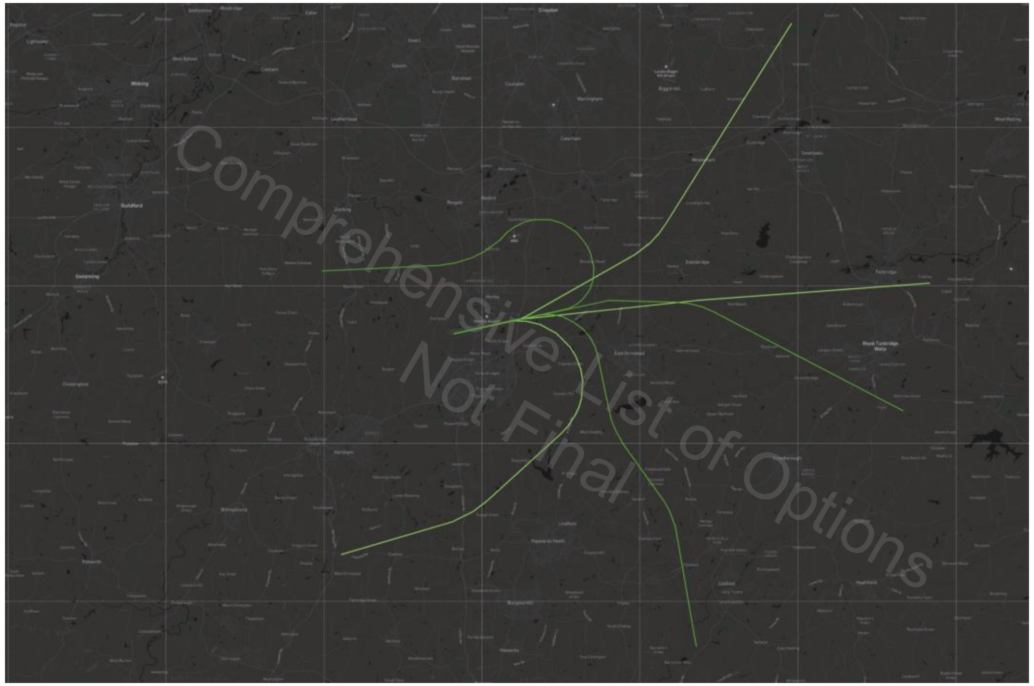
8. COMPREHENSIVE LIST OF OPTIONS



Easterly Departure Option I (EDI)	
Aims to meet	DP1 DP2 DP4 DP5 DP6 DP8
This system option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising population newly overflown. It is based on the existing nominal centrelines of the departure routes departing from Gatwick (including NPRs) up to 4000ft. To achieve the aims of DP6 and maximise environmental efficiency, from 4000ft the option will then route directly to the network exit point (green dashed lines). This will evolve as more information around the airspace above 7000ft is shared from NERL.	



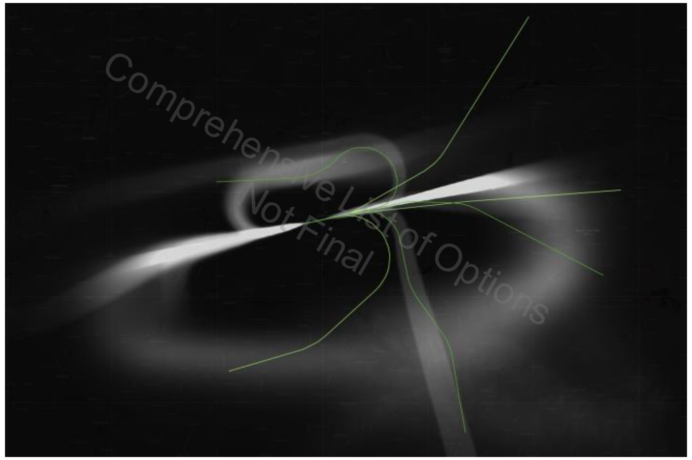
8. COMPREHENSIVE LIST OF OPTIONS



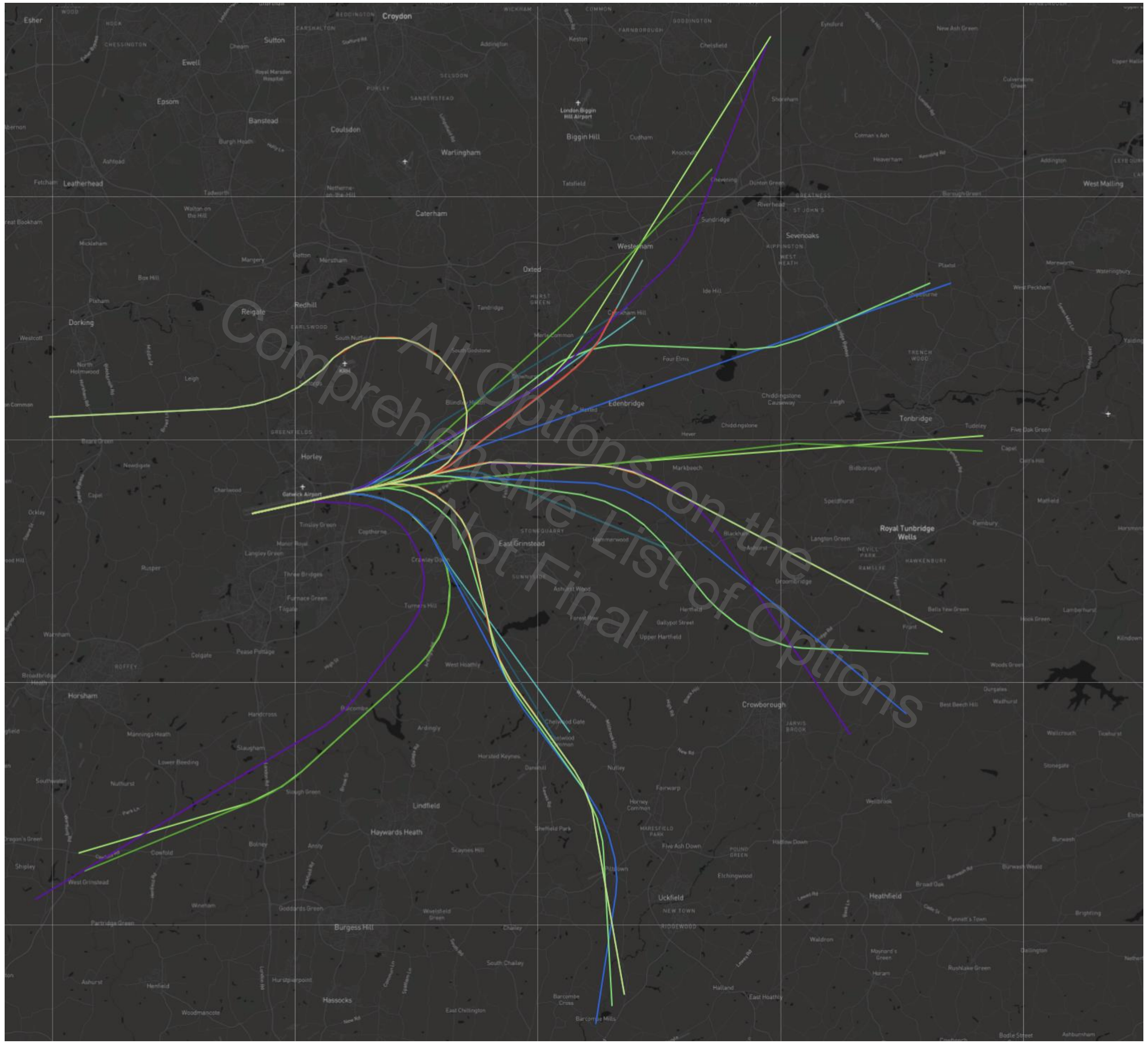
Easterly Departure Option J (EDJ)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP6 DP7 DP8 DP9

This system option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimising population newly overflown.

As a starting point, we've used system EDH (Light green). When looking to achieve respite, in order to create sufficient separation, it typically meant that paths would have to be positioned over areas where there would be a high level of population newly overflown. We've therefore created a respite option that combines a period where we minimise population newly overflown (EDH) and a period where we minimise total population overflown (EDA). In order to achieve this, we have removed one path from option EDH which closely replicated EDA. Therefore each respite option has three departure paths.



8. COMPREHENSIVE LIST OF OPTIONS



All Easterly Departure Options
The following image shows all the Easterly Departure Options (EDA – EDJ) shown on the previous slides on one image for comparison purposes.

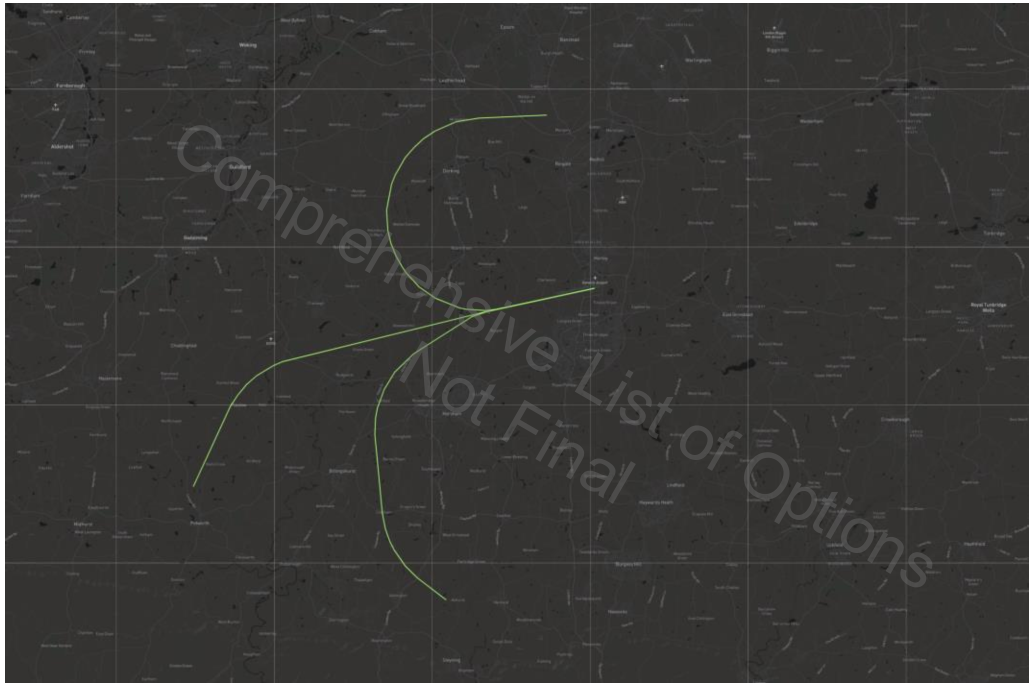
Westerly Departures

Options Development: Design Principles (Departures)

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Airspace Design Database Outputs	The airspace design shall aim to **limit and where possible reduce the adverse impacts of aircraft noise**	The airspace design should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance	Airspace design should offer long term predictability of flight paths and respite and offer adaptation for the future airport development scenarios outlined in our draft Masterplan
Minimise total population overflown 70dB SEL and total population overflown. Checked against 80dB SEL, 60dB and 65dB L_{AMax}, Area of AONB	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed within respite options using database outputs and the systems already developed for DP3. Respite options include SIDs for different periods (e.g. alternative days using different groups) or different periods of the day (e.g a set of SIDs for day and night) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Westerly Departure Option A (WDA) **Westerly Departure Option B (WDB)**	**Westerly Departure Option C (WDC)** **Westerly Departure Option D (WDD)**	**Westerly Departure Option E (WDE)** **Westerly Departure Option F (WDF)**
Minimise population newly overflown Population newly overflown >10, Population newly overflown >20, Population newly overflown >50.	System options developed using existing NPRs and SID centrelines for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using existing NPRs and database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed with respite options using database outputs. Respite options include SIDs for different periods (e.g. alternative days using different groups) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Westerly Departure Option G (WDG)	**Westerly Departure Option H (WDH)**	**Westerly Departure Option I (WDI)**

DP2 and DP4 are inherent in all notional flight paths developed

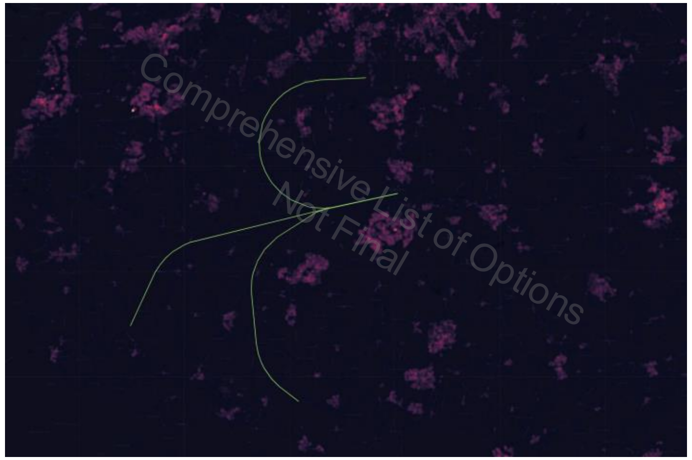
8. COMPREHENSIVE LIST OF OPTIONS

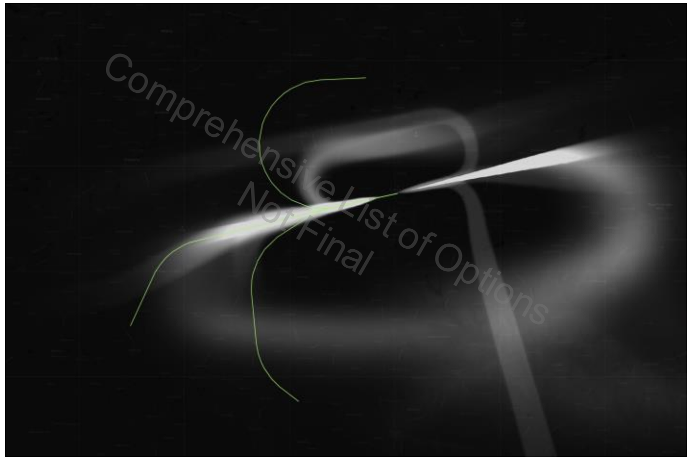


Westerly Departure Option A (WDA)	
Aims to meet	DP1 DP2 DP3 DP5 DP8 DP9

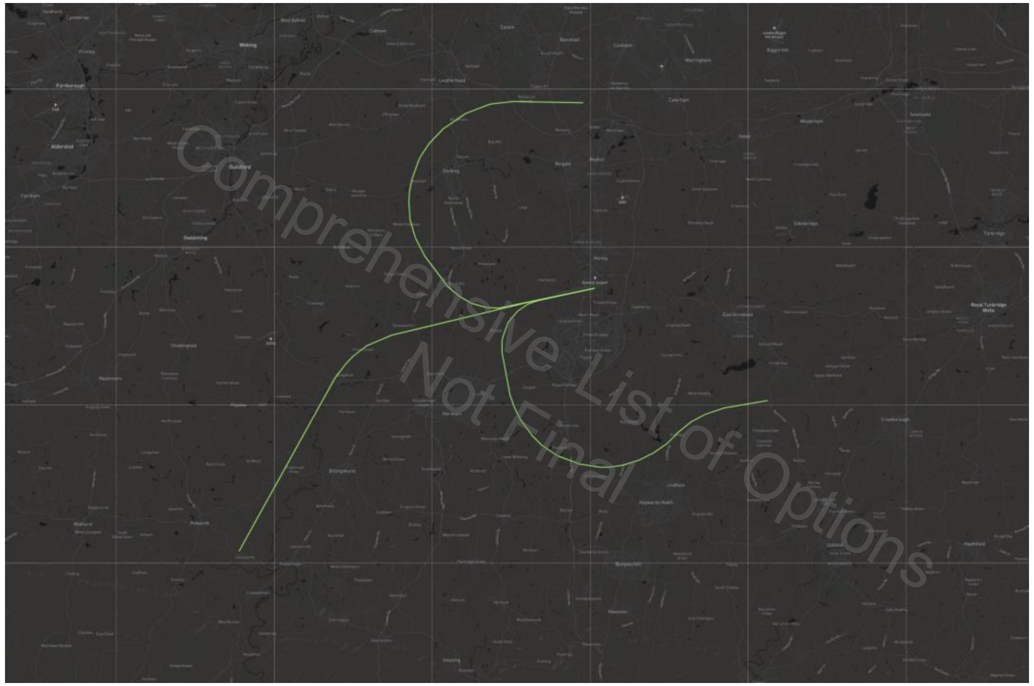
This system option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown. The primary metrics used to identify the high performing notional flight paths are '70dB SEL' and 'total population overflown'. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

This system provides a 15° split for the departure tracks which would require additional safety assurance work to be undertaken. We've therefore used the database to identify a separate system that gives greater separation (WDB). Depending on the arrivals option, there may be some conflict with arrivals for the wrap around turn; this will be explored in further detail as options are refined and our shortlist of options is known.





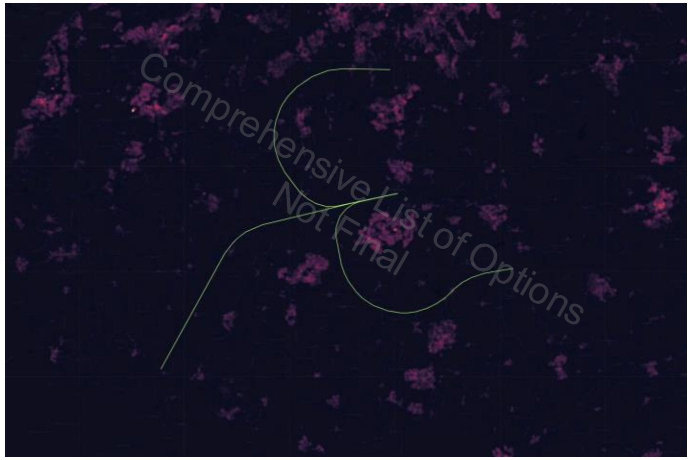
8. COMPREHENSIVE LIST OF OPTIONS

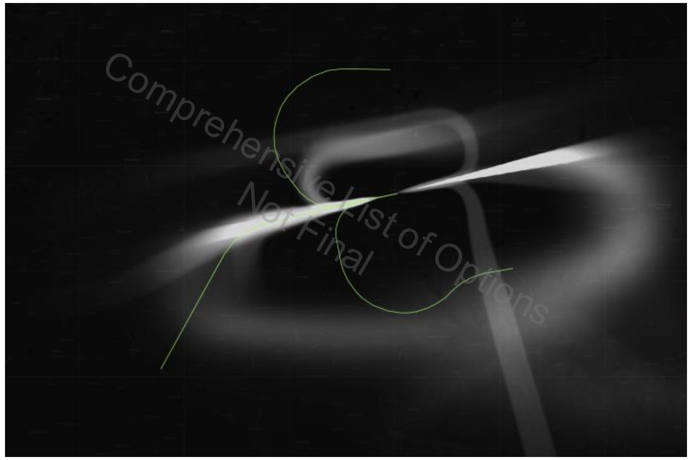


Westerly Departure Option B (WDB)	
Aims to meet	DP1 DP2 DP3 DP5 DP8 DP9

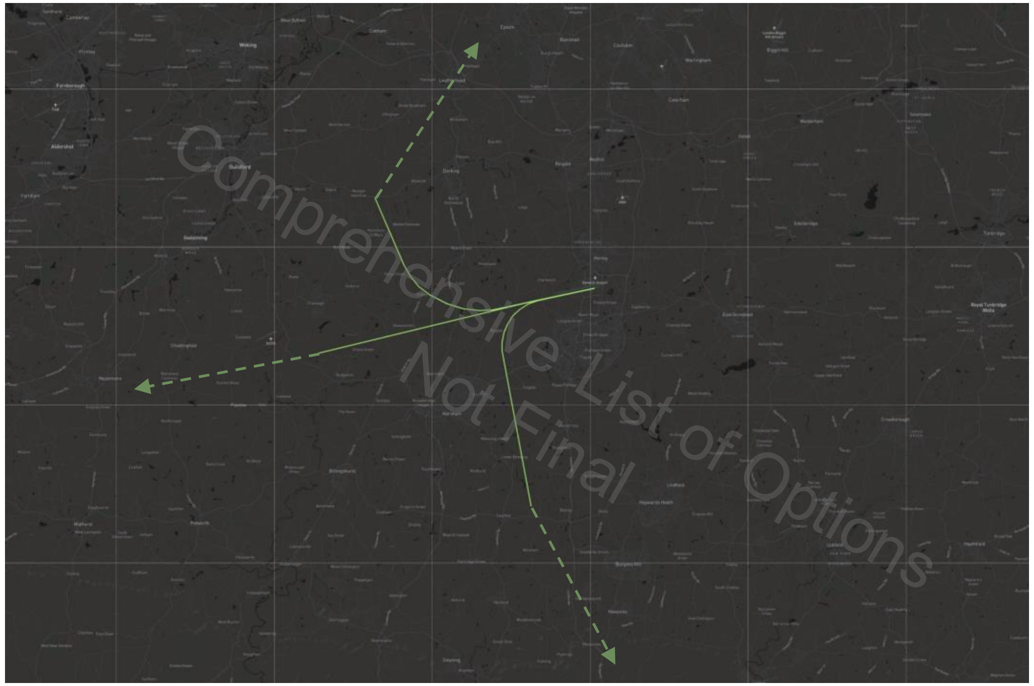
This system option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown whilst providing a greater level of departure separation than WDA. The primary metrics used to identify the high performing notional flight paths are ‘70dB SEL’ and ‘total population overflown’. A secondary check of the 80dB SEL, 60dB and 65dB L_{AMax} and Area of AONB metrics was also undertaken.

Depending on the arrivals option, there may be some conflict with arrivals for the turn to the left; this will be explored in further detail as options are refined and our shortlist of options is known.





8. COMPREHENSIVE LIST OF OPTIONS



Westerly Departure Option C (WDC)

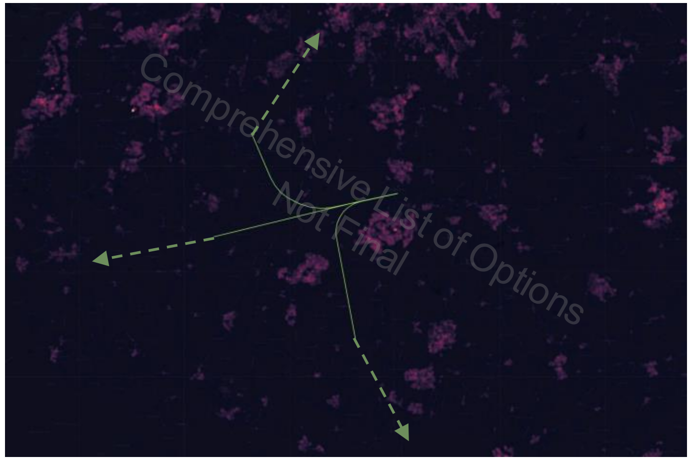
Aims to meet	DP1 DP2 DP3 DP5 DP6 DP8 DP9

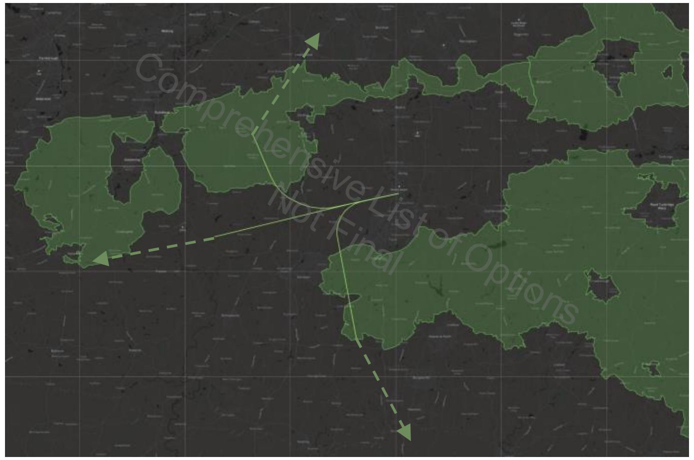
This system option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising total population overflown.

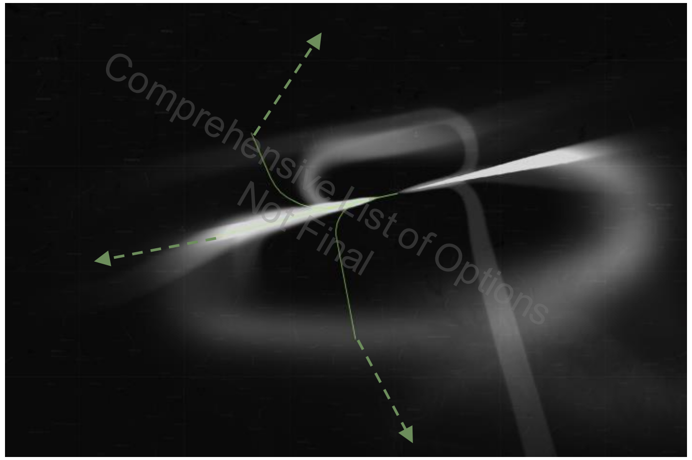
To first meet DP3, we have identified the high performing notional flight paths using the ‘70dB SEL’ and ‘total population overflown’ metrics for the paths between 0-4000ft. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

To achieve the aims of DP6, from 4000ft the option will then route directly to the network exit point (green dashed lines). We will use map underlays to make minor adjustments to the path with regards to noise. This option will evolve as more information around the airspace above 7000ft is shared from NERL.

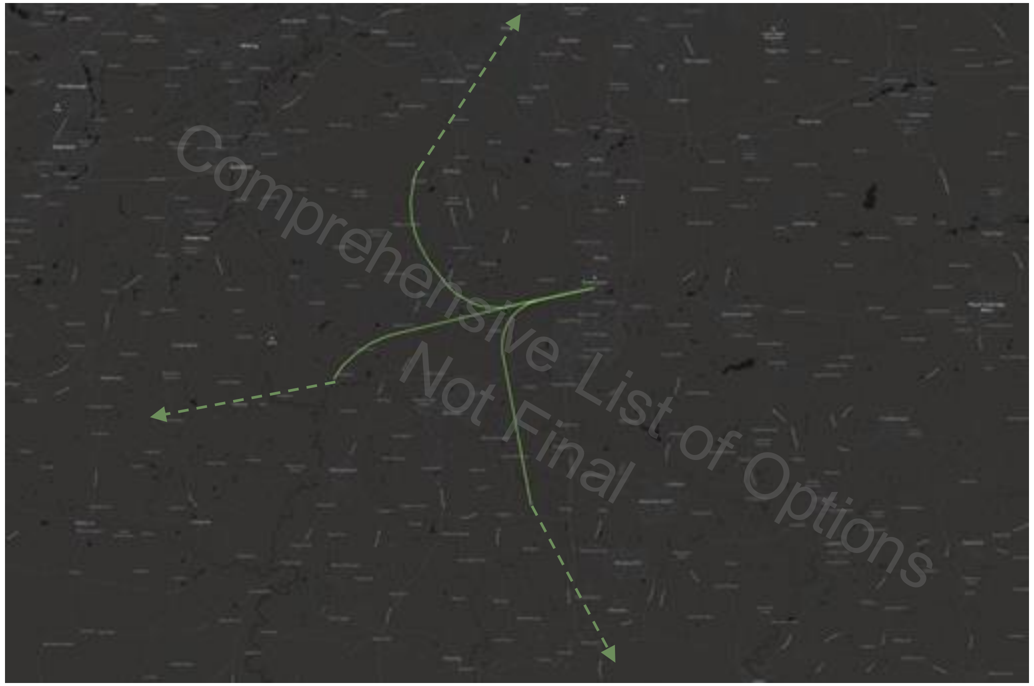
This system would require additional safety assurance work to be undertaken. We’ve therefore used the database to identify a separate system that gives greater separation (EDD).







8. COMPREHENSIVE LIST OF OPTIONS

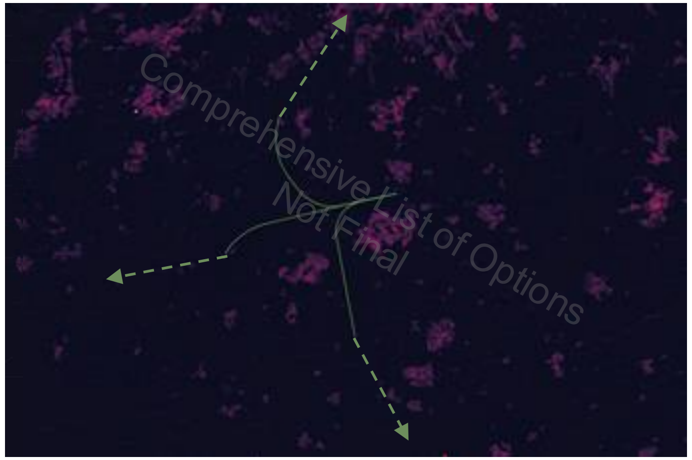


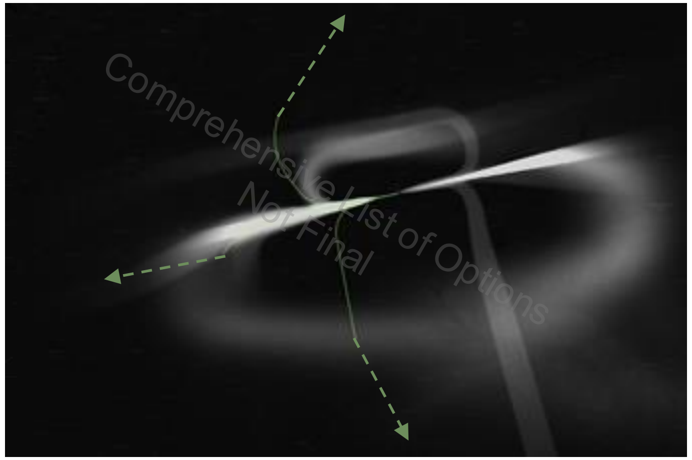
Westerly Departure Option D (WDD)	
Aims to meet	DP1 DP2 DP3 DP5 DP6 DP8 DP9

This system option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising total population overflown. whilst providing a greater level of departure separation than WDC.

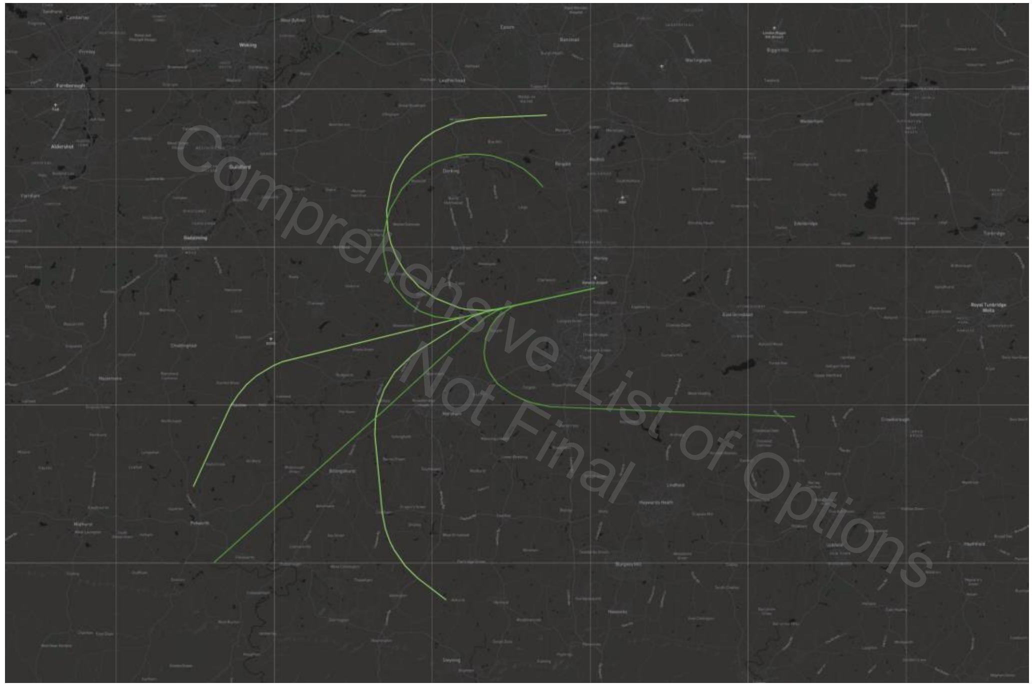
From 0-4000ft, the same metrics as WDC have been used to identify high performing notional flight paths that have greater than 30° separation.

To achieve the aims of DP6, from 4000ft the option will then route directly to the network exit point (green dashed lines). This will evolve as more information around the airspace above 7000ft is shared from NERL.





8. COMPREHENSIVE LIST OF OPTIONS

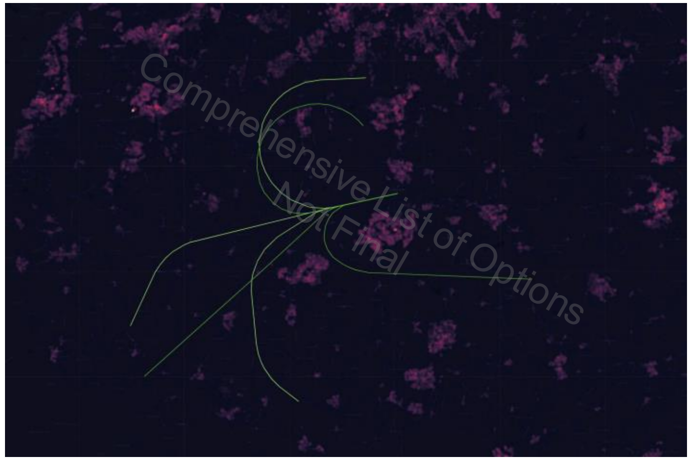


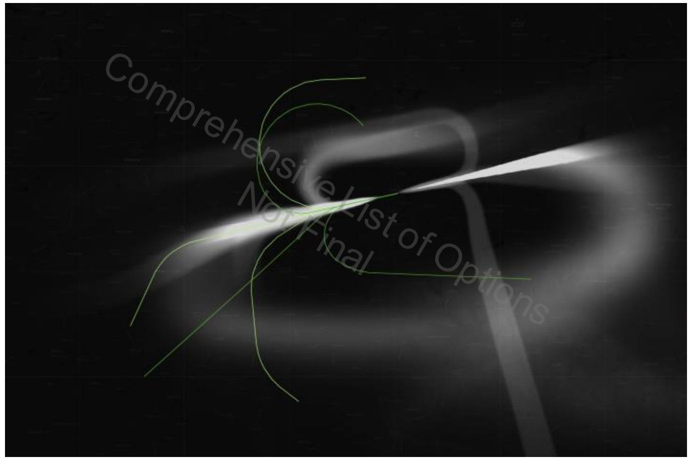
Westerly Departure Option E (WDE)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This system option aims to offer respite (DP7). We've built upon WDA (light green) and identified tracks that offer respite (dark green).

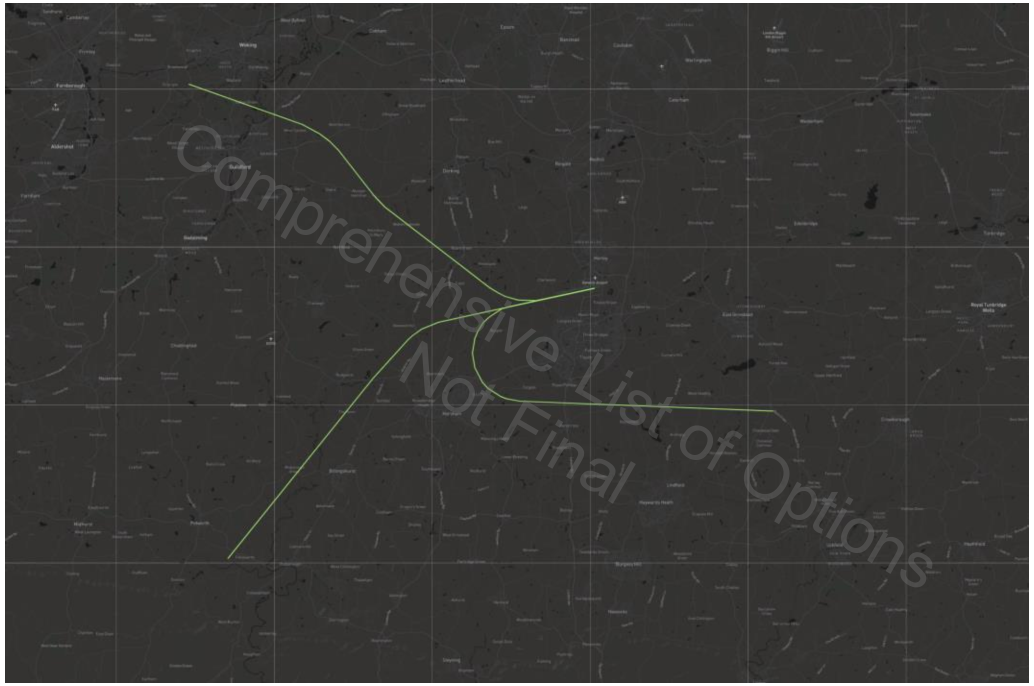
The primary metrics used to identify the high performing notional flight paths are '70dB SEL' and 'total population overflown'. A secondary check of the 80dB SEL, 60dB and 65dB LAMax and Area of AONB metrics was also undertaken.

Depending on the arrivals option, there may be some conflict with arrivals for the wrap around turns; this will be explored in further detail as options are refined and our shortlist of options is known.





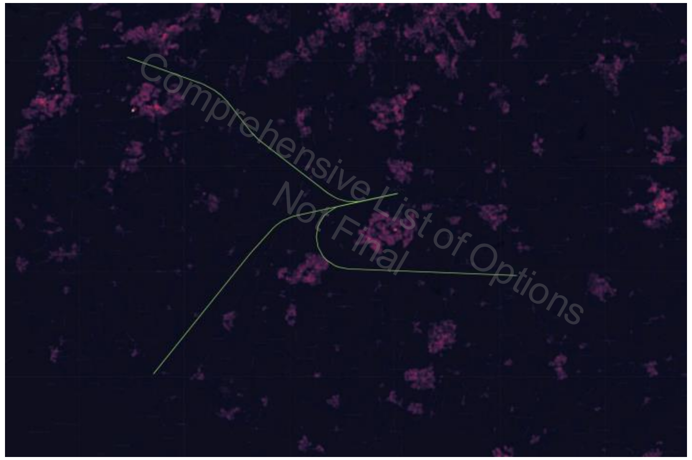
8. COMPREHENSIVE LIST OF OPTIONS

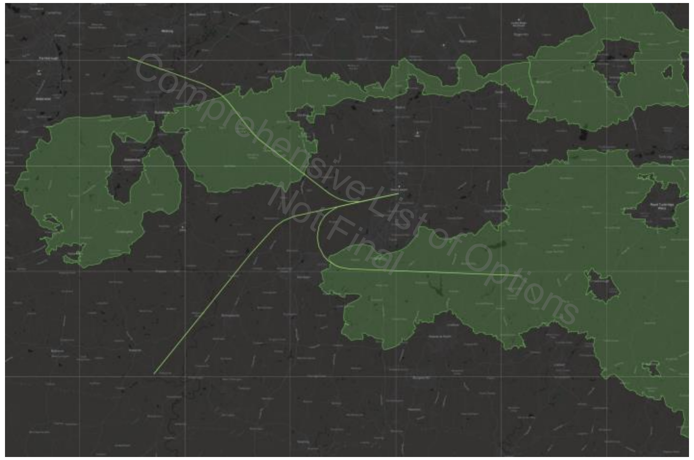


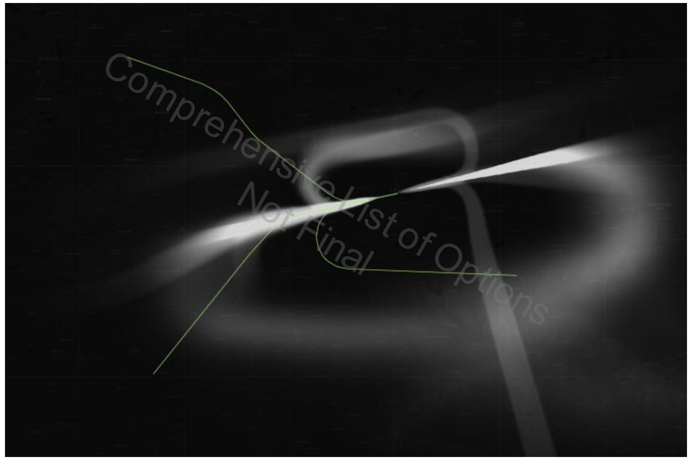
Westerly Departure Option F (WDF)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This system has been developed as a respite option that could be operated during the night. It could be combined with any WDA, WDB, WDC, WDD. Depending on its overall performance which we'll explore later in the process, this system could also be used during the day although the metrics used to develop it are targeted at the night time period.

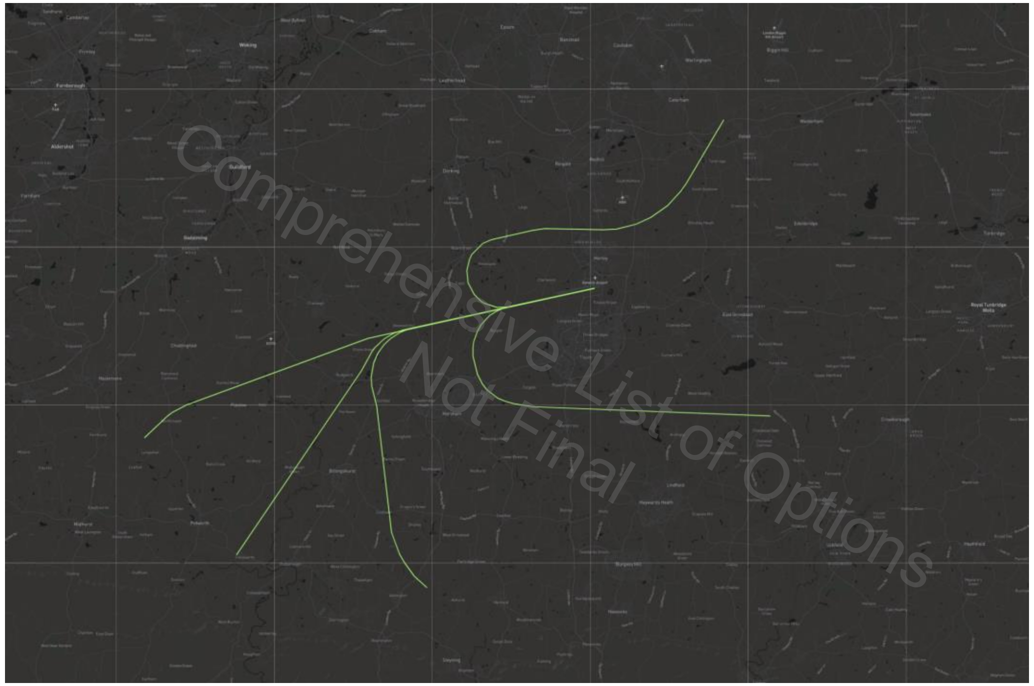
The primary metrics used to identify the high performing notional flight paths focus on minimising total adverse noise effects at night and are '80dB SEL' and 'total population overflown'. A secondary check of the 65dB LAMax was also undertaken.



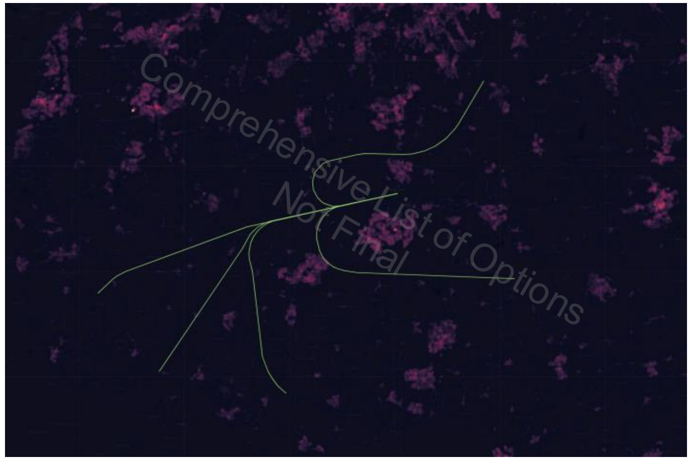


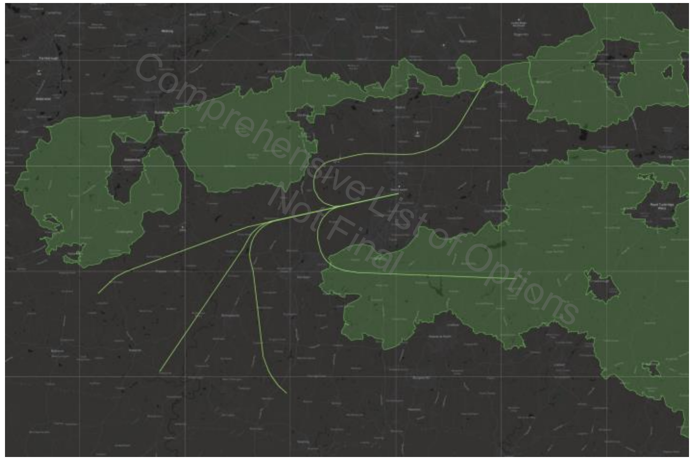


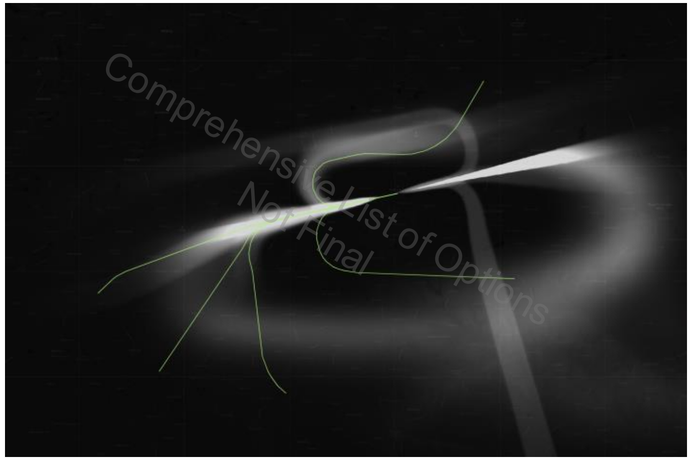
8. COMPREHENSIVE LIST OF OPTIONS



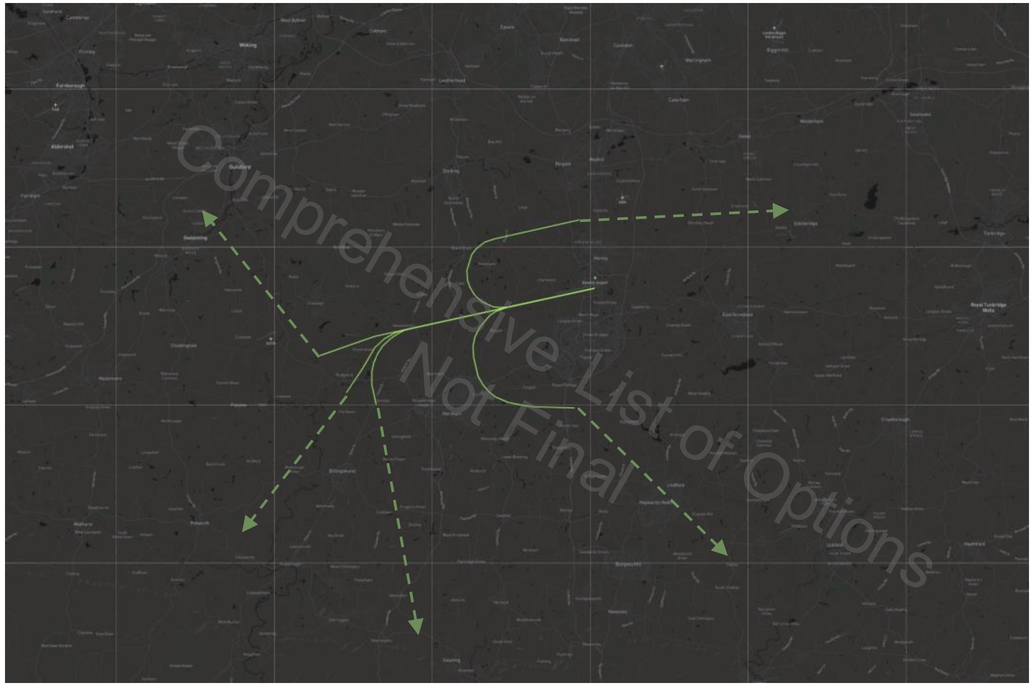
Westerly Departure Option G (WDG)	
Aims to meet	DP1 DP2 DP3 DP5 DP8 DP9
This system option focuses on meeting DP3 (limit adverse noise effects) and minimising population newly overflown. It is based on the existing nominal centrelines of the departure routes departing from Gatwick (including NPRs) however the vertical performance of these routes has been updated to reflect continuous climb performance.	







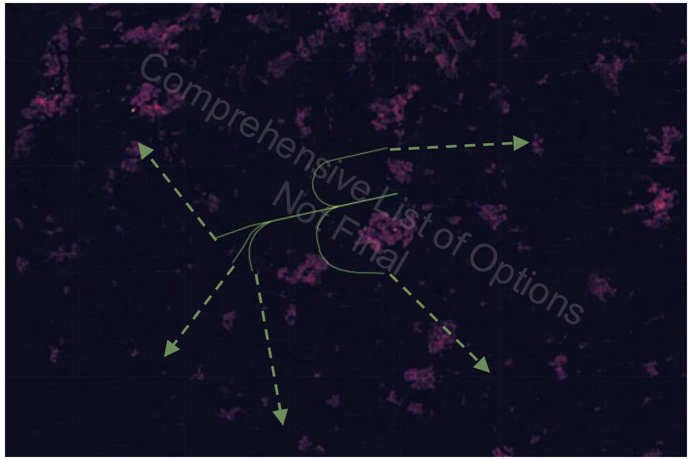
8. COMPREHENSIVE LIST OF OPTIONS

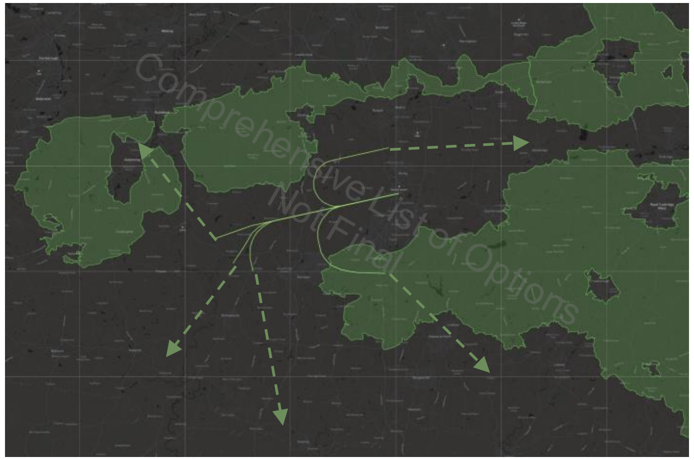


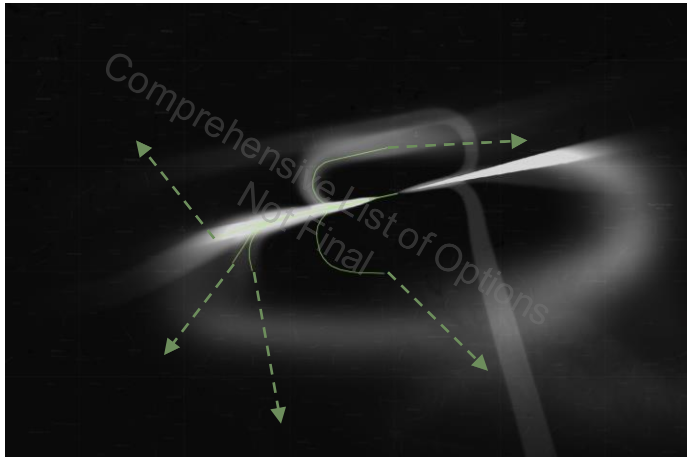
Westerly Departure Option H (WDH)	
Aims to meet	DP1 DP2 DP3 DP5 DP6 DP8 DP9

This system option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising population newly overflown. It is based on the existing nominal centrelines of the departure routes departing from Gatwick (including NPRs) up to 4000ft.

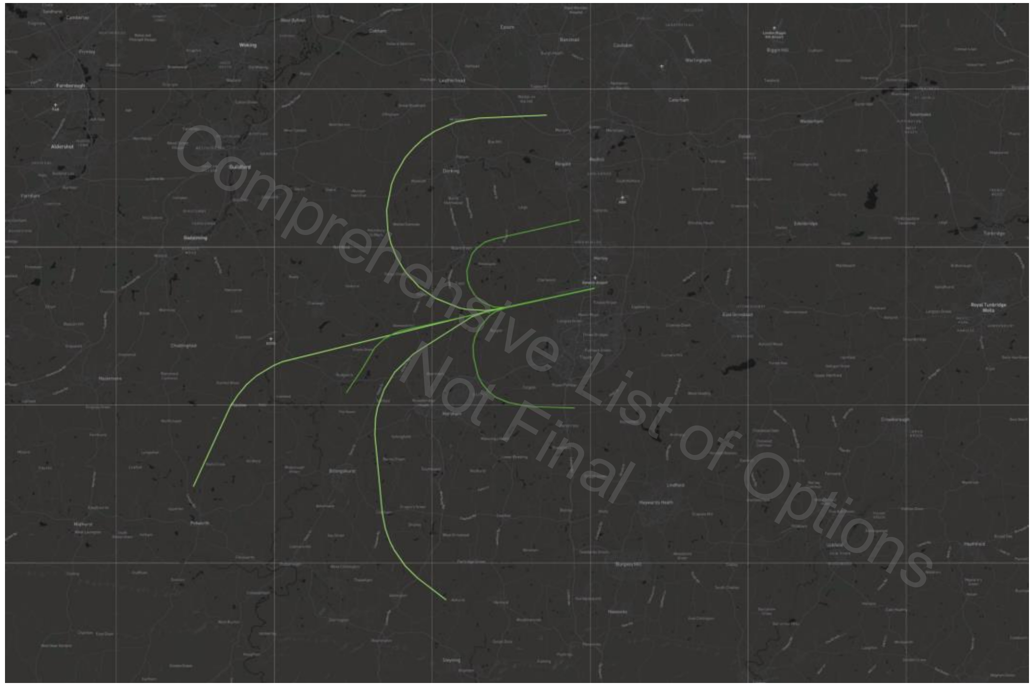
To achieve the aims of DP6 and maximise environmental efficiency, from 4000ft the option will route directly to the network exit point (green dashed lines). This will evolve as more information around the airspace above 7000ft is shared from NERL.







8. COMPREHENSIVE LIST OF OPTIONS

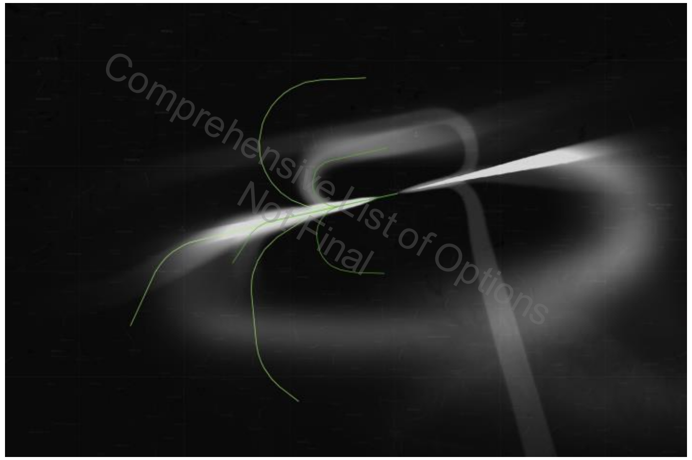


Westerly Departure Option I (WDI)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP6 DP7 DP8 DP9

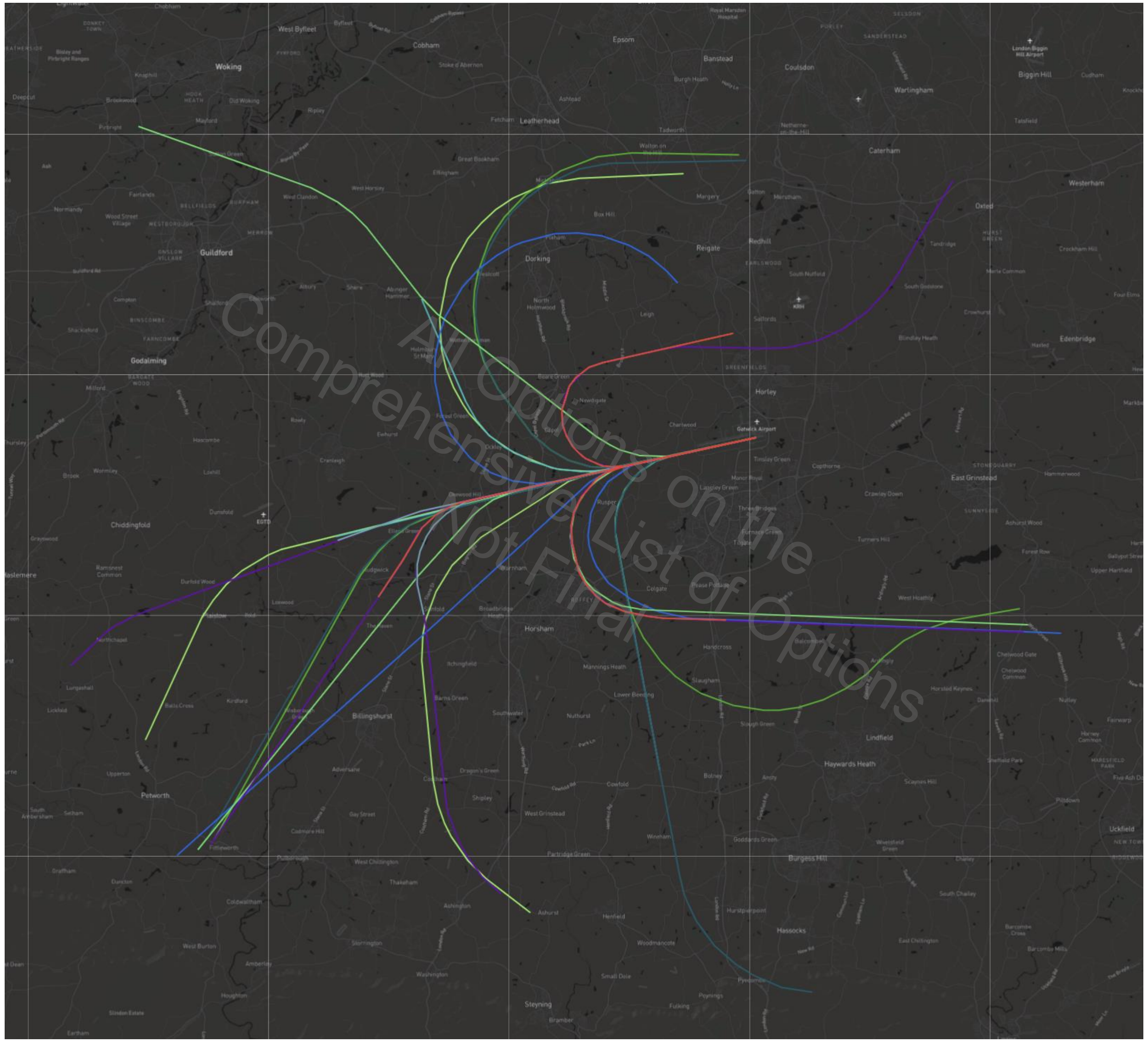
This system option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimising population newly overflown.

As a starting point, we've used system WDG (dark green). When looking to achieve respite, in order to create sufficient separation, it typically meant that paths would have to be positioned over areas where there would be a high level of population newly overflown. We've therefore created a respite option that combines a period where we minimise population newly overflown by taking some of the paths used in option (WDG) and a period where we minimise total population overflown (WDA).

In order to achieve this, we have removed two of the paths from option WDG which closely replicated WDA. In the resulting respite option, WDG and EDA both have three departure paths.



8. COMPREHENSIVE LIST OF OPTIONS



All Westerly Departure Options

The following image shows all the Westerly Departure Options (WDA – WDI) shown on the previous slides on one image for comparison purposes.

Easterly Arrivals

Options Development: Design Principles (Arrivals)

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Airspace Design Database Outputs	The airspace design shall aim to **limit and where possible reduce the adverse impacts of aircraft noise**	The airspace design should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance	Airspace design should offer long term predictability of flight paths and respite and offer adaptation for the future airport development scenarios outlined in our draft Masterplan
Minimise total population overflown 70dB SEL and total population overflown. Checked against 80dB SEL, 60dB and 65dB L_{AMax}, Area of AONB	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed within respite options using database outputs and the systems already developed for DP3. Respite options include SIDs for different periods (e.g. alternative days using different groups) or different periods of the day (e.g a set of SIDs for day and night) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Easterly Arrival Option A (EAA) **Easterly Arrival Option B (EAB)**	**Easterly Arrival Option C (EAC)**	**Easterly Arrival Option D (EAD)** **Easterly Arrival Option E (EAE)** **Easterly Arrival Option F (EAF)**
Minimise population newly overflown Population newly overflown >10, Population newly overflown >20, Population newly overflown >50.	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using existing NPRs and database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed with respite options using database outputs. Respite options include SIDs for different periods (e.g. alternative days using different groups) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Easterly Arrival Option G (EAG) **Easterly Arrival Option H (EAH) (vectoring)**	**Easterly Arrival Option I (EAI)**	**Easterly Arrival Option J (EAJ)**

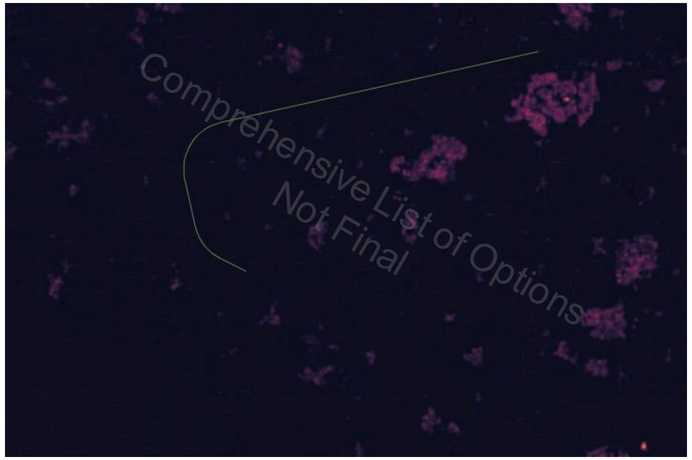
DP2 and DP4 are inherent in all notional flight paths developed

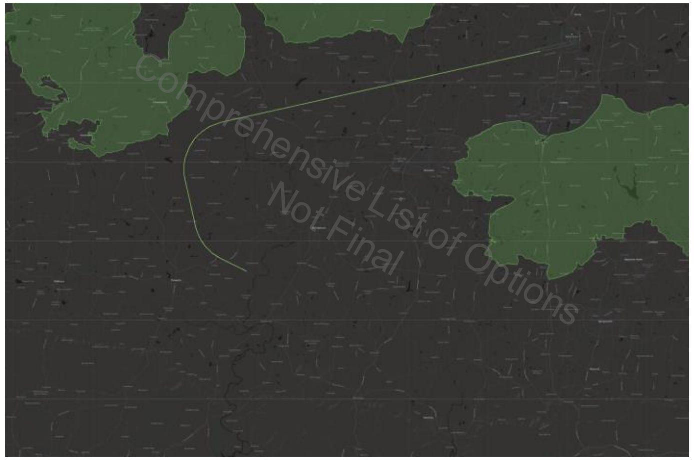
8. COMPREHENSIVE LIST OF OPTIONS

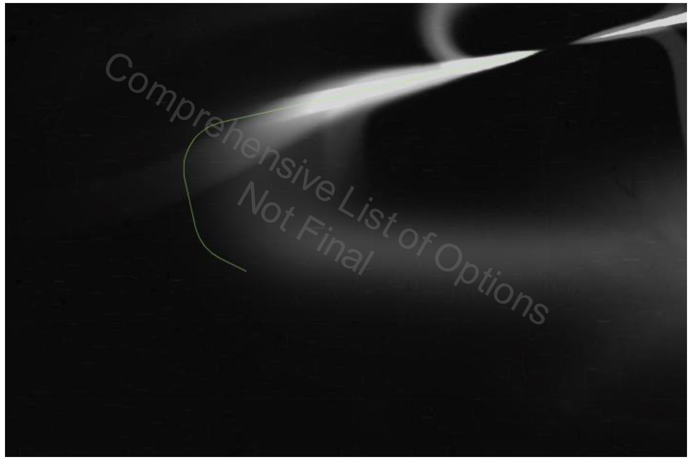
Easterly Arrival Option A (EAA)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP6 DP8 DP9

This system option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown. As the SEL data sits along the final approach track, the primary metric used to identify the high performing notional flight path is the ‘total population overflown’. A secondary check of Area of AONB metrics was also undertaken.

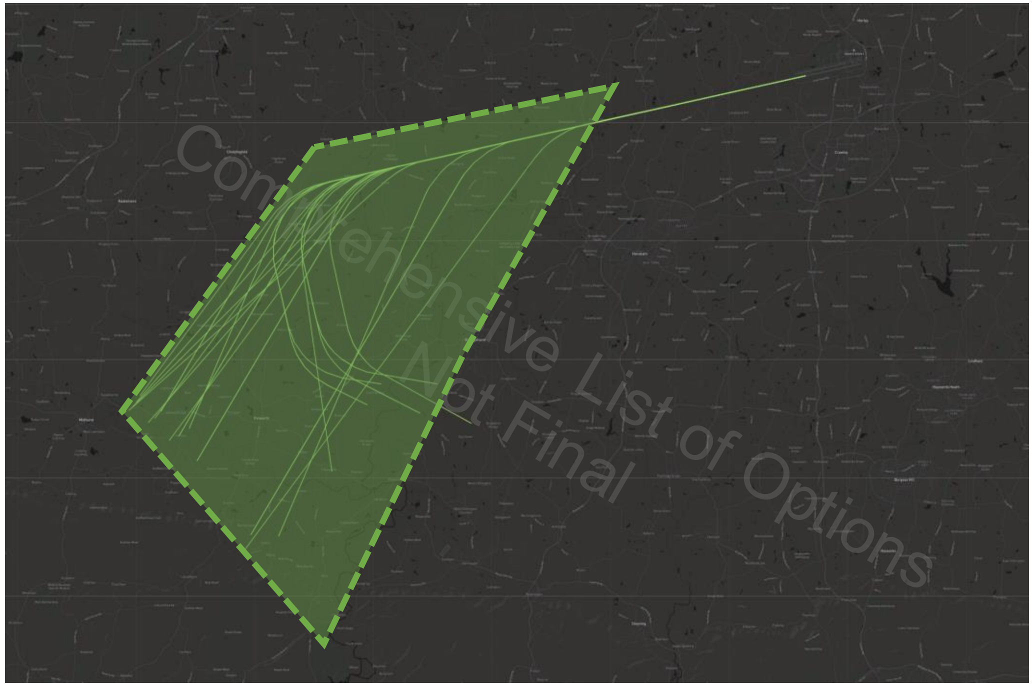
We anticipate that at the point of implementation, the technology required from the upper network to facilitate single track PBN arrivals during periods of high traffic will not be available. We have therefore used the data around the highest performing notional flight paths to identify a vectoring area that would be used by controllers in certain traffic scenarios (EAB).







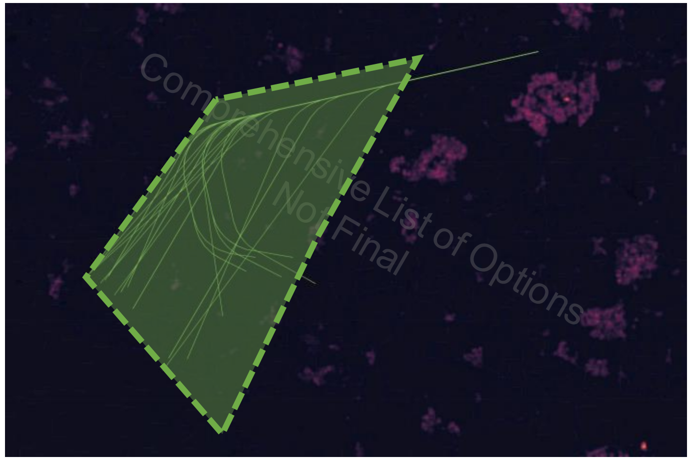
8. COMPREHENSIVE LIST OF OPTIONS

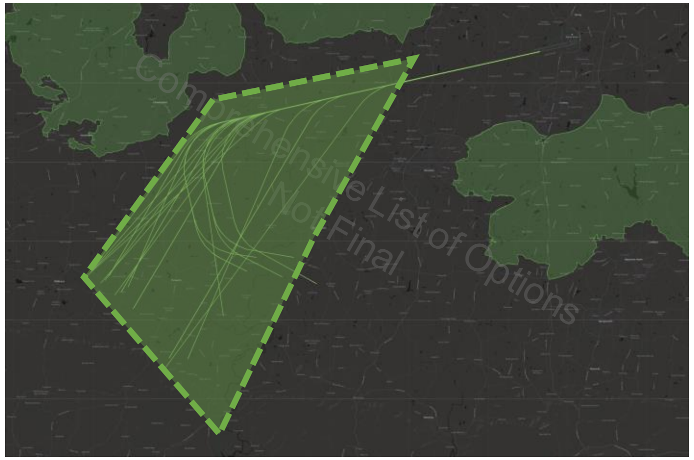


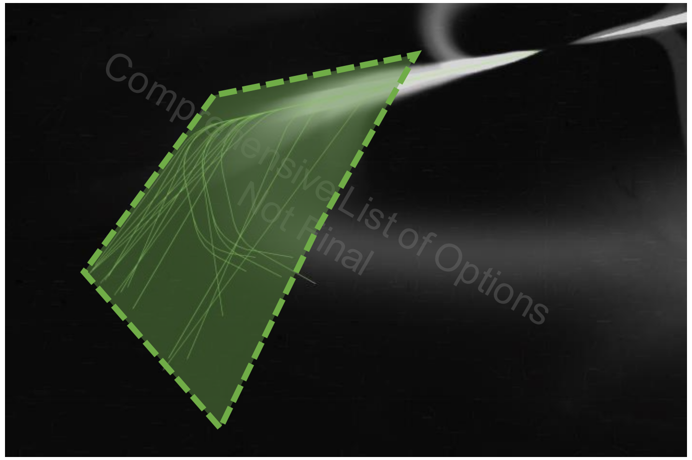
Easterly Arrival Option B (EAB)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP9

This arrival option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown. It is intended it would be used in combination with a PBN option.

The primary ‘total population overflown’ metric was used to identify the high performing notional flight paths that could be used to define a vectoring area. This is an initial indicative vectoring area subject to change as we engage with ATC and the upper network as the ACP progresses.







8. COMPREHENSIVE LIST OF OPTIONS

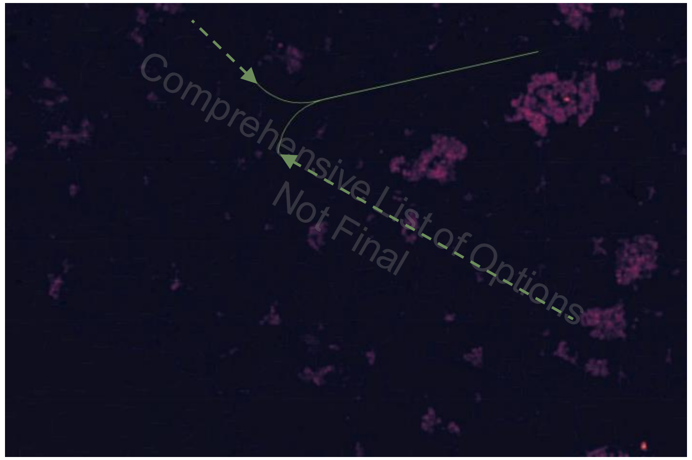
Easterly Arrival Option C (EAC)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

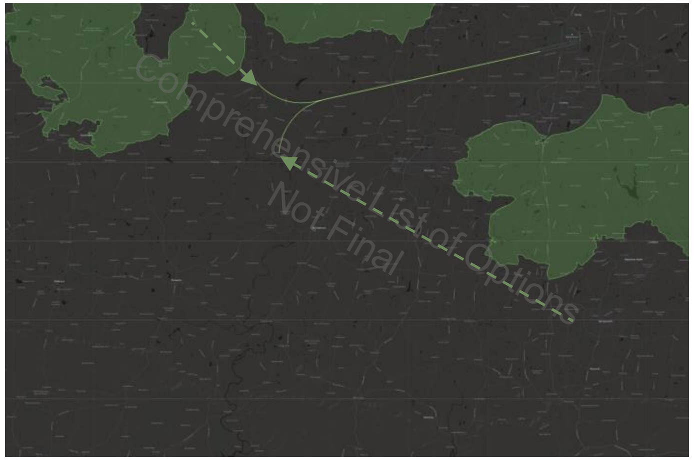
This arrival option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising total population overflown.

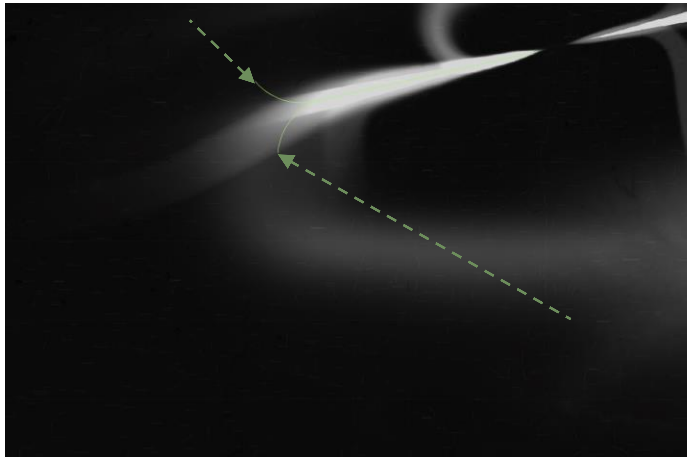
To first meet DP3, we have identified high performing notional flight paths using the 'total population overflown metric for paths between 0-4000ft. A check against areas of AONB was also undertaken.

To achieve the aims of DP6, from 4000ft the option will then route directly from the network entry point (green dashed lines). We will use map population and other map underlays to make minor adjustments to the path with regards to noise. This option will evolve as more information around the airspace above 7000ft is shared from NERL.

We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (EAB) in certain traffic scenarios.







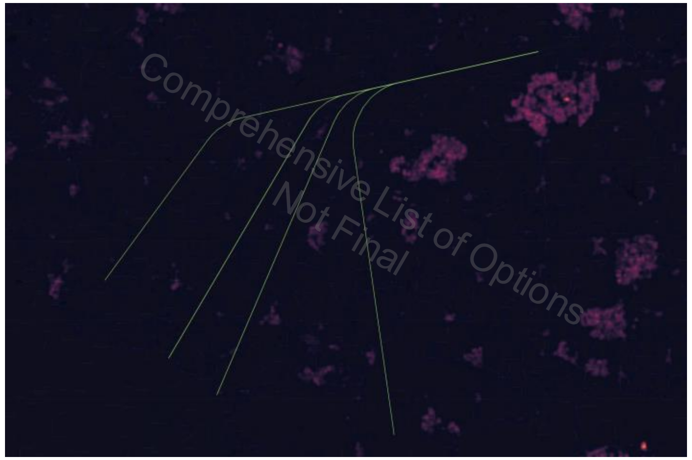
8. COMPREHENSIVE LIST OF OPTIONS

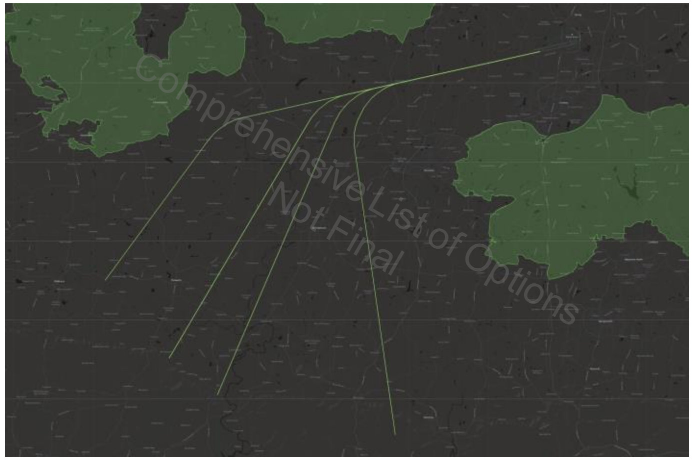
Easterly Arrival Option D (EAD)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8 DP9

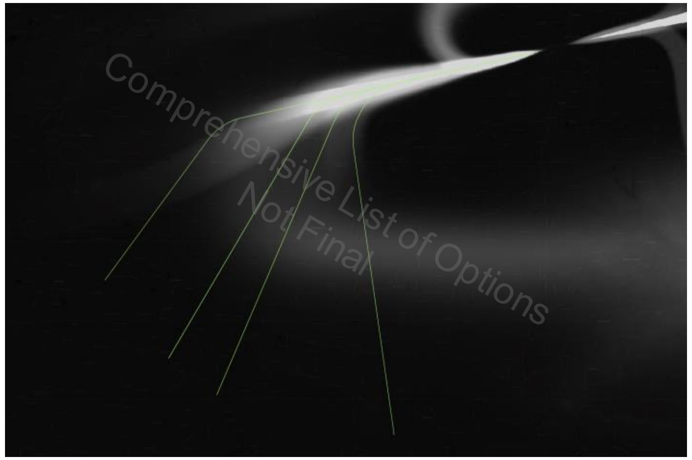
This arrival option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimise total population overflown.

We've used the total population overflown metric as the primary metric to identify notional flight paths that could be used in combination to provide respite. This arrival option avoids AONBs. The three paths selected could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution of noise (FED) study is completed.

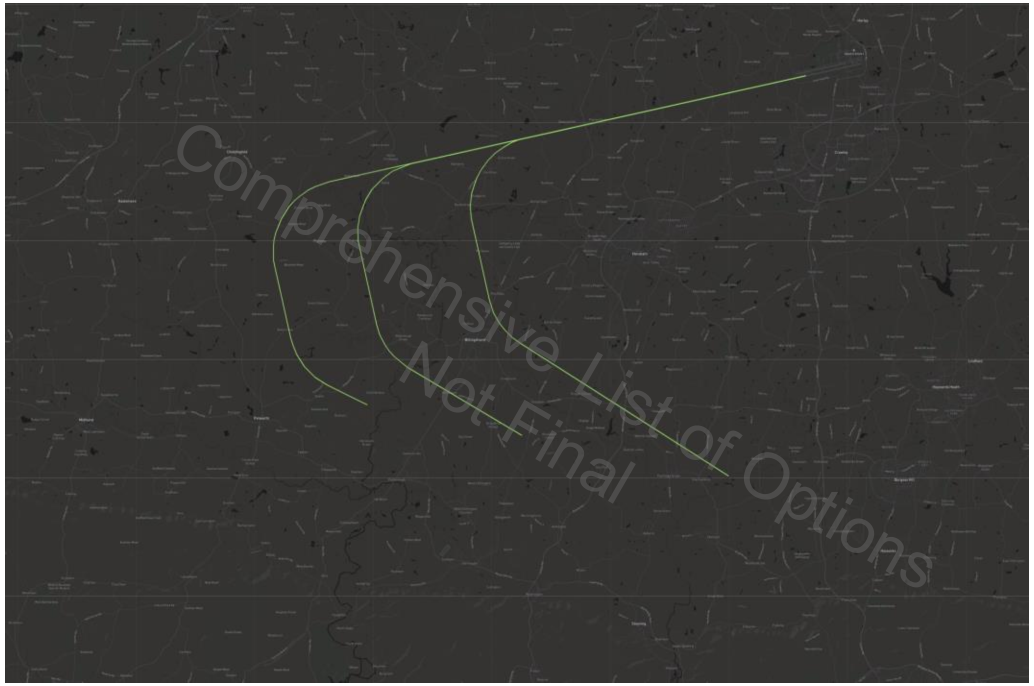
We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (EAB) in certain traffic scenarios.







8. COMPREHENSIVE LIST OF OPTIONS (SPLIT INTO TWO)



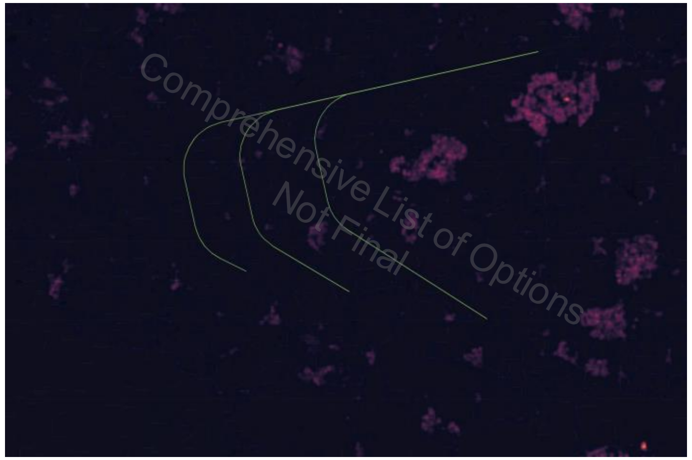
Easterly Arrival Option E (EAE)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

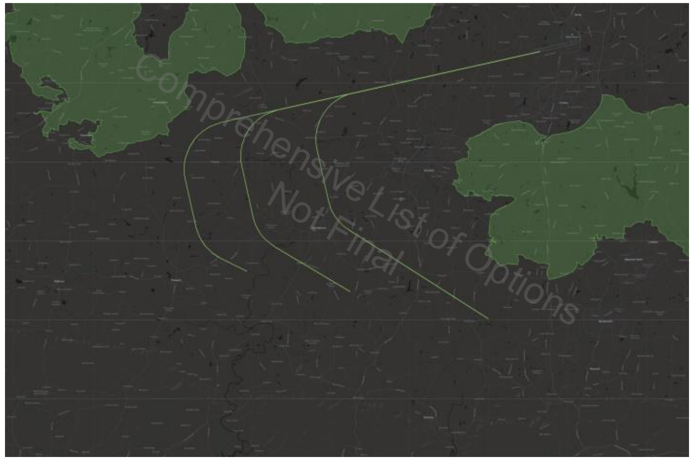
This arrival option focuses on DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimising total population overflown.

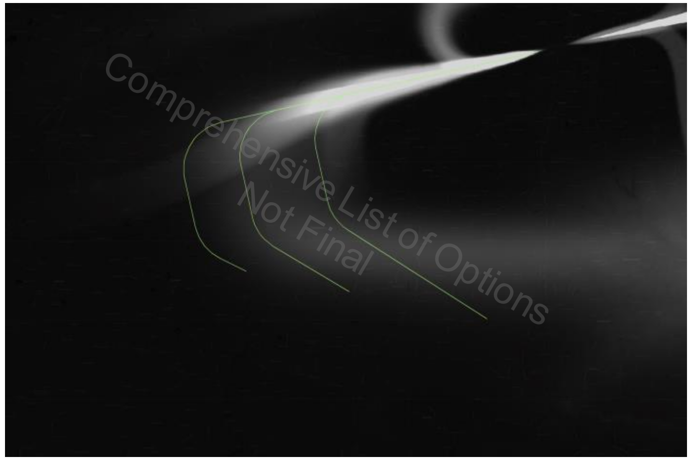
We've used the total population overflown metric as the primary metric to identify notional flight paths that could be used in combination to provide respite. When we've looked at the data, two sets of path performed comparatively well and therefore we have split them into two respite groups EAD and EAE.

The three paths could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution of noise (FED) study is completed.

We anticipate that at the point of implementation, the technology required from the upper airspace network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (EAB) in certain traffic scenarios.







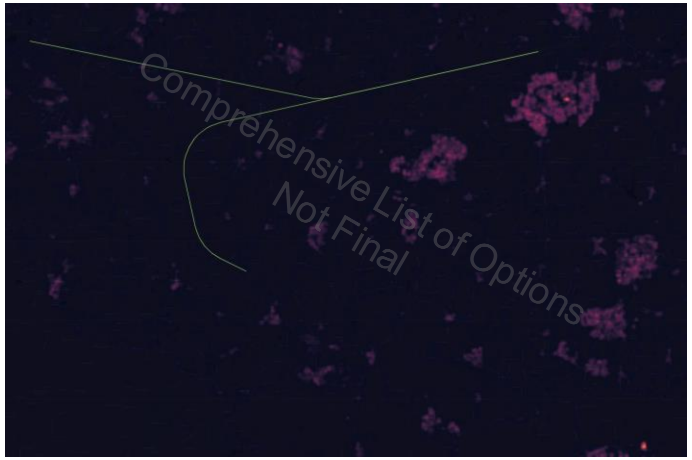
8. COMPREHENSIVE LIST OF OPTIONS

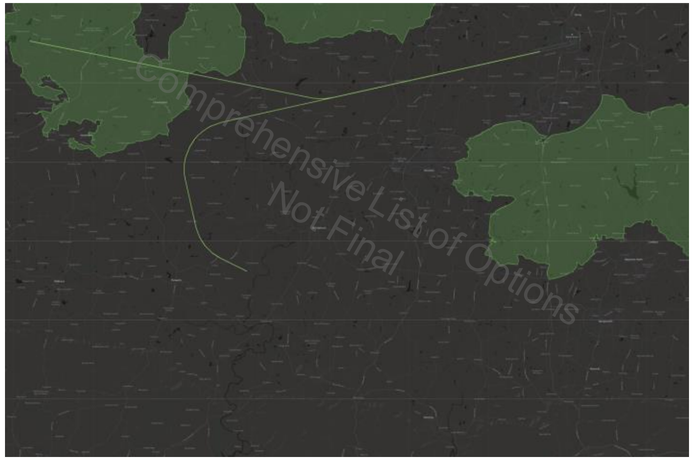
Easterly Arrival Option G (EAF)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP6 DP8

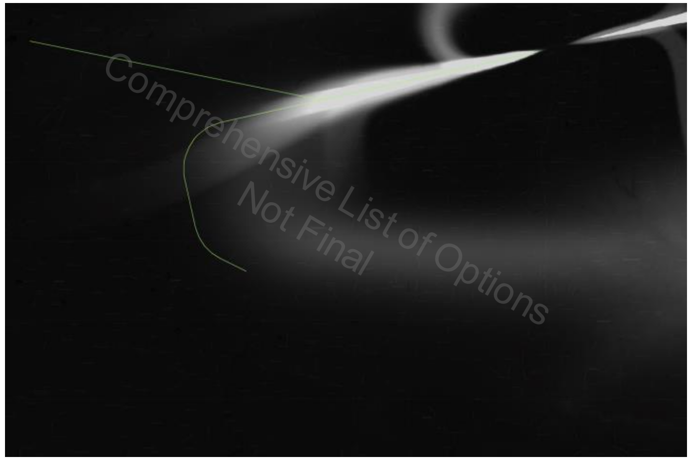
This night time arrival option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities), DP7 and minimising total population overflown.

The northern path of this option has been selected using the total population overflown metric. It would offer a ‘short cut’ to operators at night when traffic conditions may be able to facilitate an arrival directly from the north.

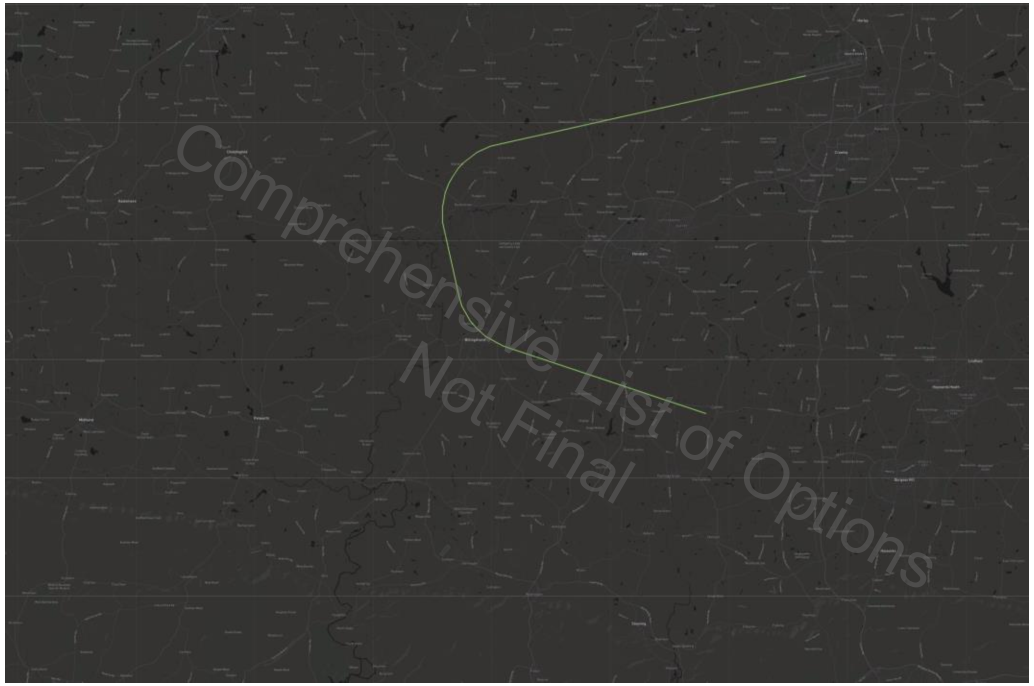
This could be used alongside EAA EAB EAC EAD and EAE. Due to interdependencies with Heathrow we anticipate this only being available at night – this is something we will explore further as we progress through the masterplan process.







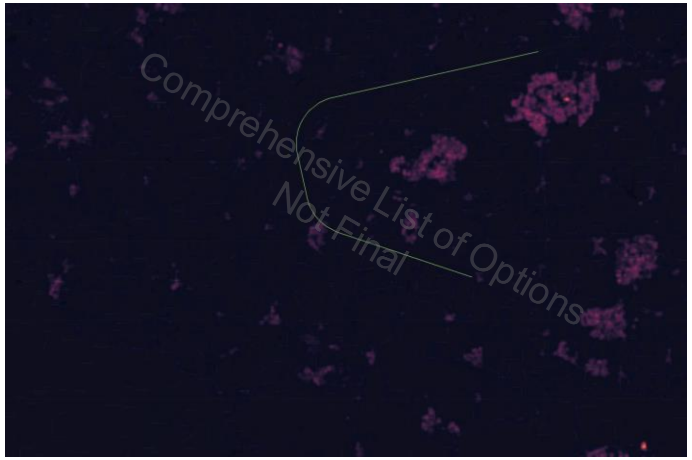
8. COMPREHENSIVE LIST OF OPTIONS

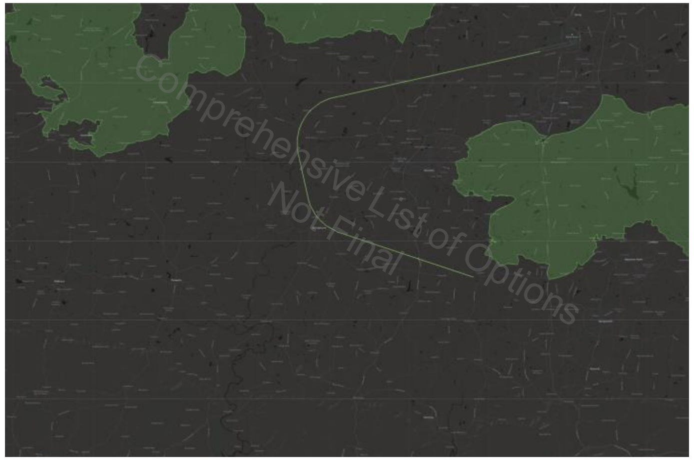


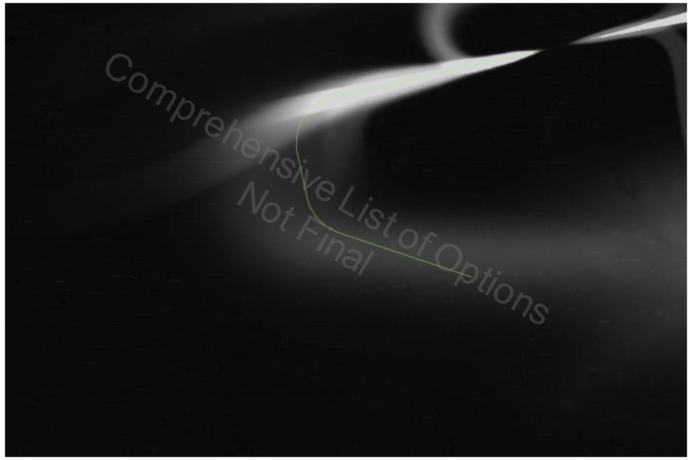
Easterly Arrival Option G (EAG)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This system option focuses on meeting DP3 (limit adverse noise effects) and minimising population newly overflown. As the SEL data sits along the final approach track, the primary metric used to identify the high performing notional flight path is based on population newly overflown overflight contours and data around existing arrival flight paths.

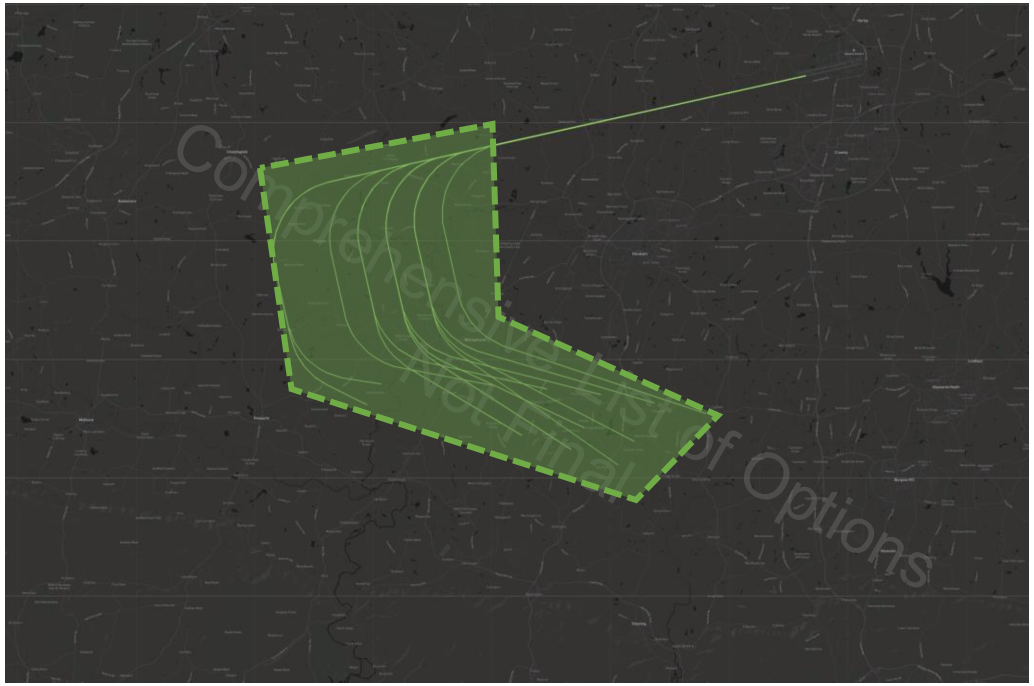
We anticipate that at the point of implementation, the technology required from the upper network to facilitate single track PBN arrivals during periods of high traffic will not be available. We have therefore used the data around the highest performing notional flight paths to identify a vectoring area that would be used by controllers in certain traffic scenarios (EAG).







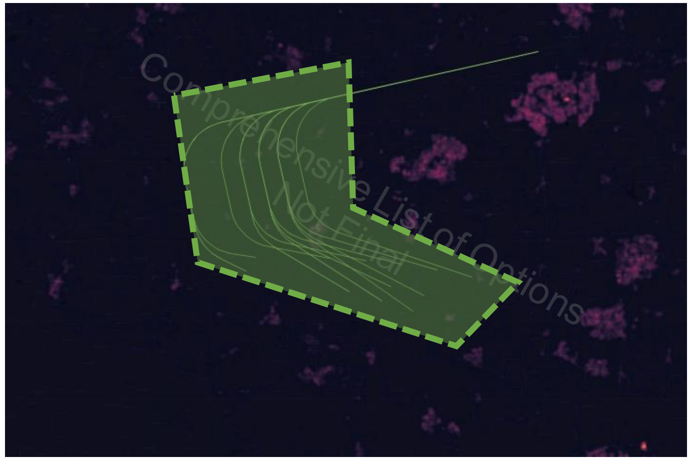
8. COMPREHENSIVE LIST OF OPTIONS

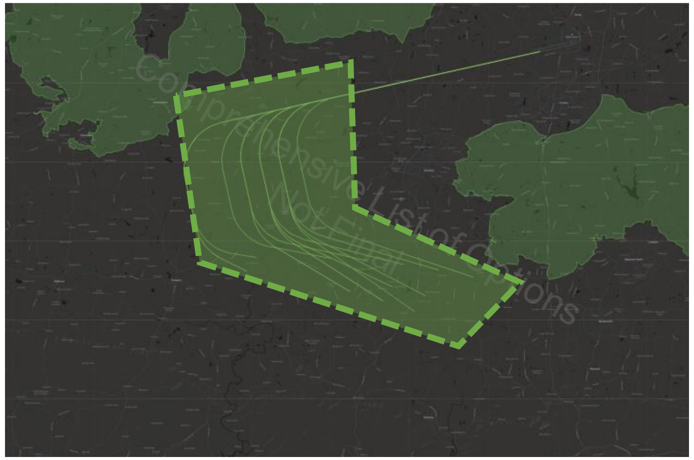


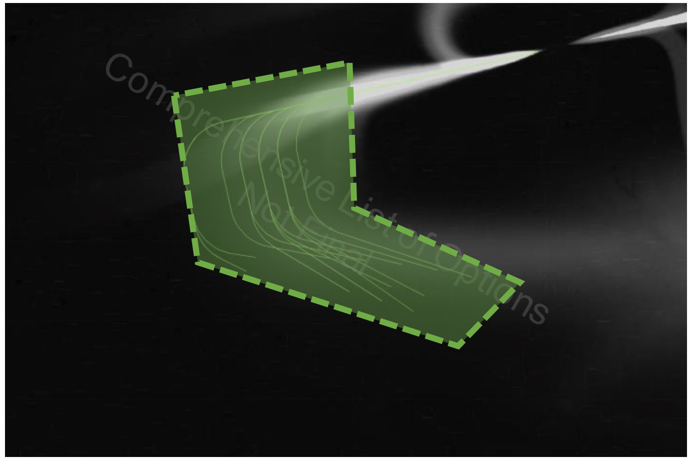
Easterly Arrival Option H (EAH)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This arrival option focuses on meeting DP3 (limit adverse noise effects) and minimising population newly overflown. It is intended it would be used in combination with a PBN option.

The population newly overflown overflight contours were used to identify the high performing notional flight paths that could be used to define a vectoring area. This is an initial indicative vectoring area subject to change as we engage with ATC and the upper network as the ACP progresses.







8. COMPREHENSIVE LIST OF OPTIONS

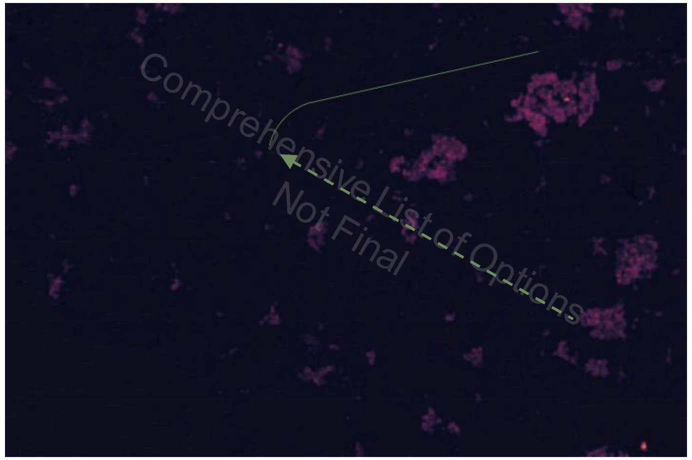
Easterly Arrival Option I (EAI)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

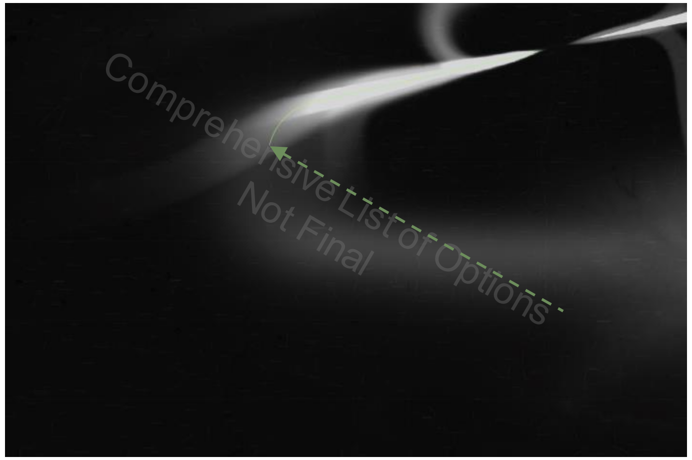
This arrival option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising population newly overflown.

To first meet DP3, we have identified high performing notional flight paths using the population newly overflown contours between 0-4000ft. A check against areas of AONB was also undertaken.

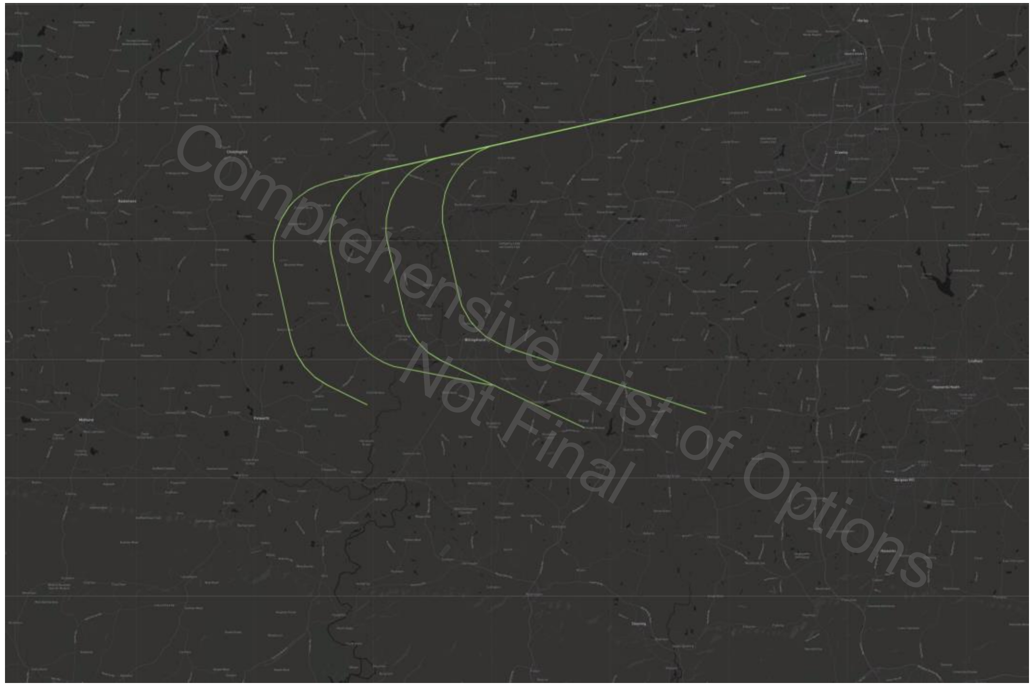
To achieve the aims of DP6, from 4000ft the option will then route directly from the network entry point (green dashed lines). We will use existing overflight map underlays to make minor adjustments to the path. This option will evolve as more information around the airspace above 7000ft is shared from NERL.

We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (EAG) in certain traffic scenarios.





8. COMPREHENSIVE LIST OF OPTIONS

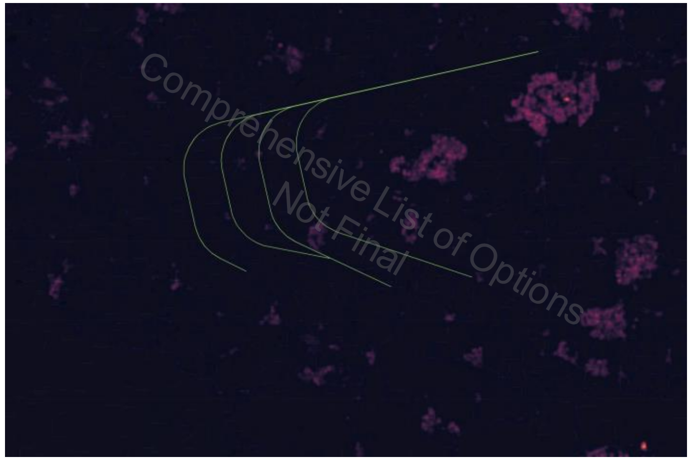


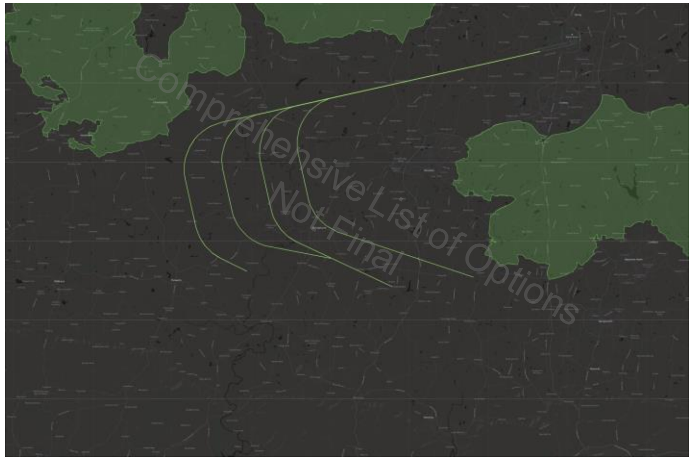
Easterly Arrival Option J (EAJ)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

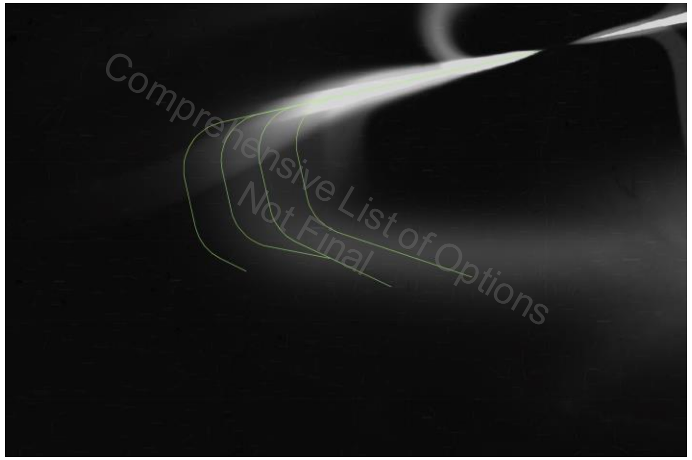
This arrival option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimise population newly overflown.

We've used the population newly overflown contours as the primary metric to identify notional flight paths that could be used in combination to provide respite. This arrival option avoids AONBs. The four paths selected could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution of noise (FED) study is completed.

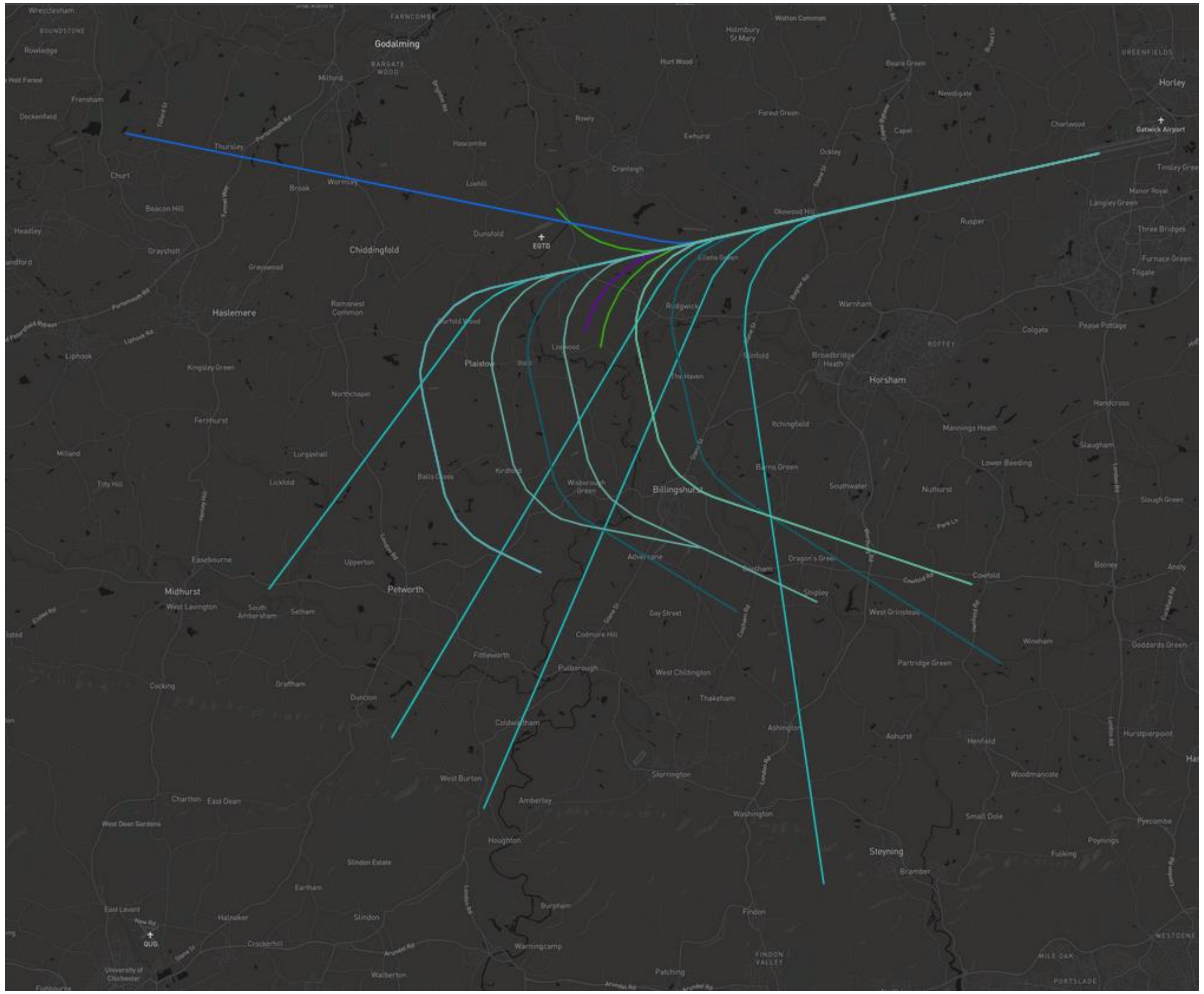
We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (EAG) in certain traffic scenarios.







8. COMPREHENSIVE LIST OF OPTIONS



All Easterly Arrival Options

The following image shows all the **PBN** Easterly Arrival Options shown on the previous slides on one image for comparison purposes.

Westerly Arrivals

Options Development: Design Principles (Arrivals)

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Airspace Design Database Outputs	The airspace design shall aim to **limit and where possible reduce the adverse impacts of aircraft noise**	The airspace design should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance	Airspace design should offer long term predictability of flight paths and respite and offer adaptation for the future airport development scenarios outlined in our draft Masterplan
Minimise total population overflown 70dB SEL and total population overflown. Checked against 80dB SEL, 60dB and 65dB L_{AMax}, Area of AONB	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed within respite options using database outputs and the systems already developed for DP3. Respite options include SIDs for different periods (e.g. alternative days using different groups) or different periods of the day (e.g a set of SIDs for day and night) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Westerly Arrival Option A (WAA) **Westerly Arrival Option B (WAB)**	**Westerly Arrival Option C (WAC)**	**Westerly Arrival Option D (WAD)** **Westerly Arrival Option E (WAE)**
Minimise population newly overflown Population newly overflown >10, Population newly overflown >20, Population newly overflown >50.	System options developed using database outputs for 0-7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed using existing NPRs and database outputs for DP3 between 0-4000ft, and track mileage outputs (balanced with noise metrics) between 4000 – 7000ft. Options developed aim to also meet DP1 DP5 and DP8	System options developed with respite options using database outputs. Respite options include SIDs for different periods (e.g. alternative days using different groups) Options developed aim to also meet DP1 DP5 DP8 and DP9
	Westerly Arrival Option F (WAF) **Westerly Arrival Option G (WAG)**	**Westerly Arrival Option H (WAH)**	**Westerly Arrival Option I (WAI)**

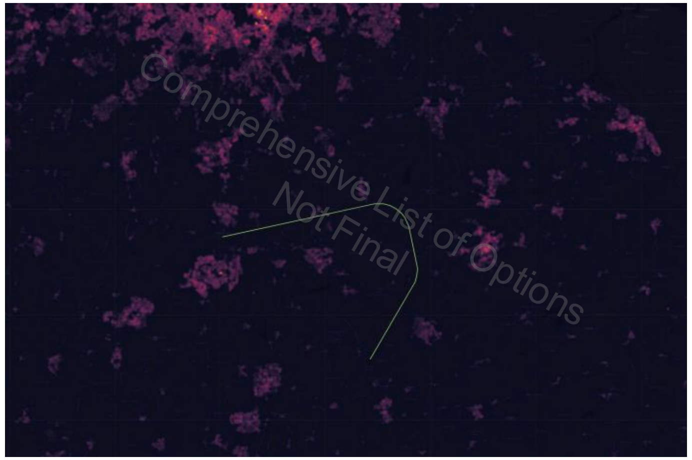
DP2 and DP4 are inherent in all notional flight paths developed

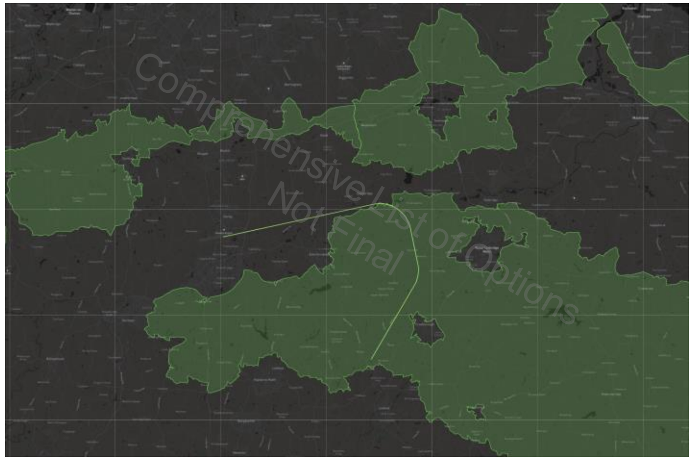
8. COMPREHENSIVE LIST OF OPTIONS

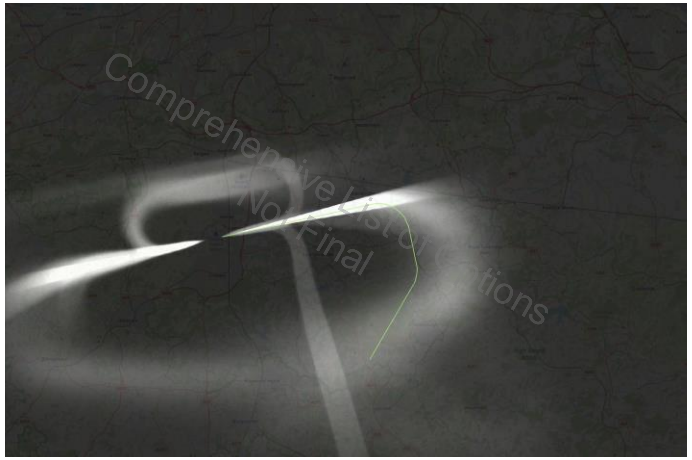
Westerly Arrival Option A (WAA)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This system option focuses on meeting DP3 (limit adverse noise effects) and minimising total population overflown. As the SEL data sits along the final approach track, the primary metric used to identify the high performing notional flight path is the 'total population overflown'. A secondary check of Area of AONB metrics was also undertaken.

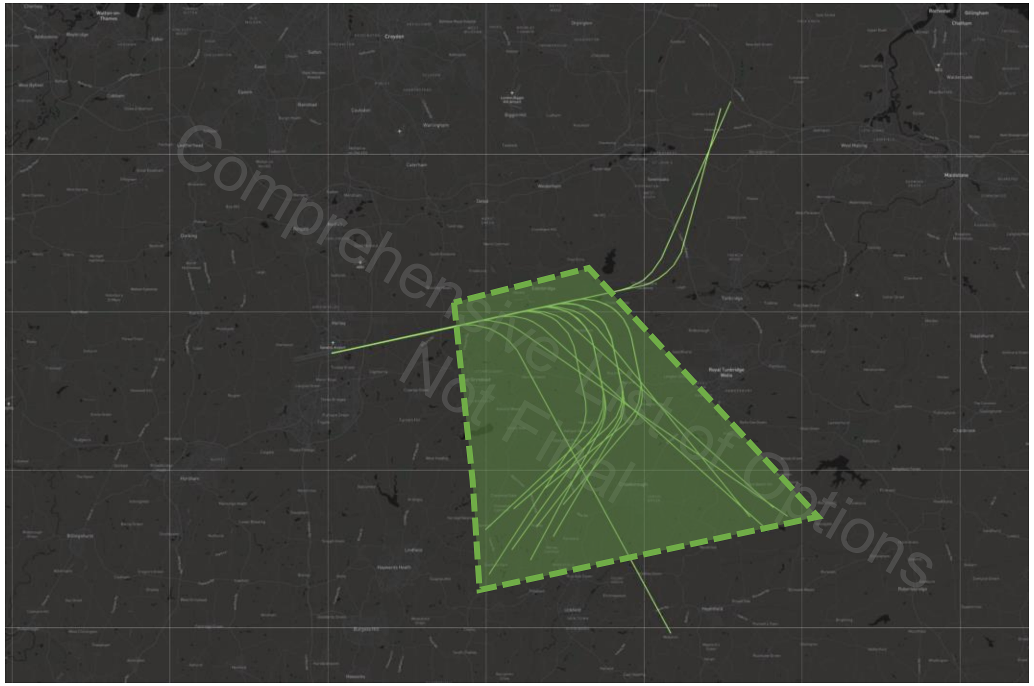
We anticipate that at the point of implementation, the technology required from the upper network to facilitate single track PBN arrivals during periods of high traffic will not be available. We have therefore used the data around the highest performing notional flight paths to identify a vectoring area that would be used by controllers in certain traffic scenarios (WAB).







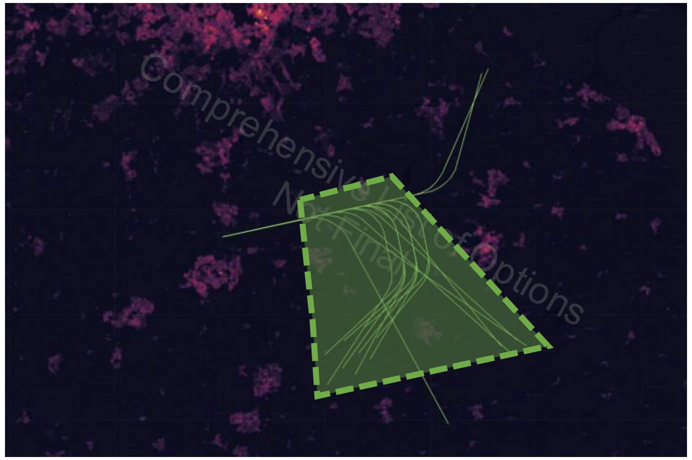
8. COMPREHENSIVE LIST OF OPTIONS

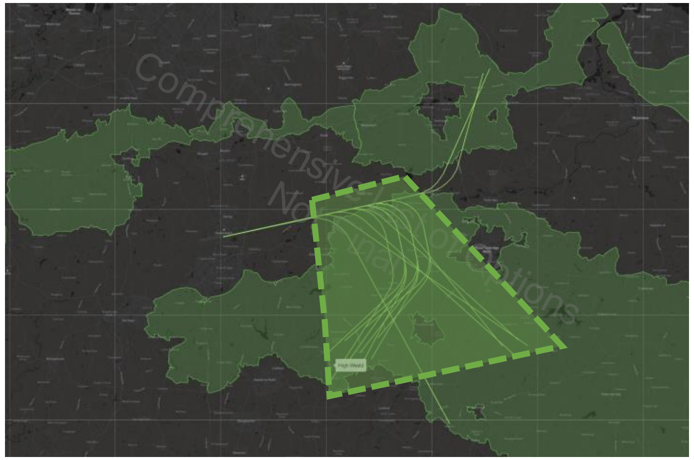


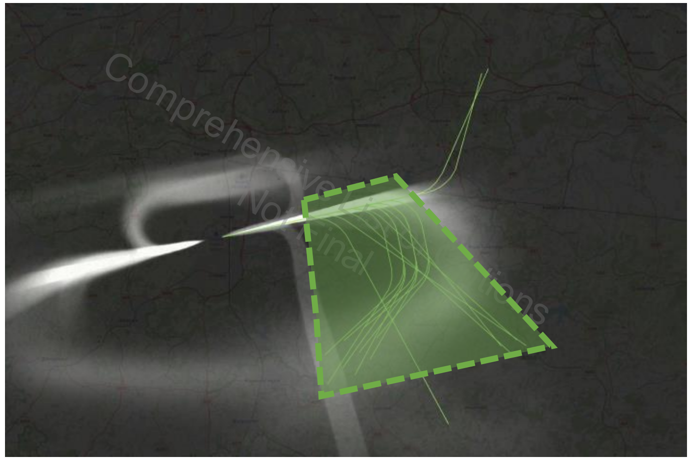
Westerly Arrival Option B (WAB)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP9

This arrival option focuses on meeting DP3 (limit adverse noise effects) and minimising minimising total population overflown. It is intended it would be used in combination with a PBN option.

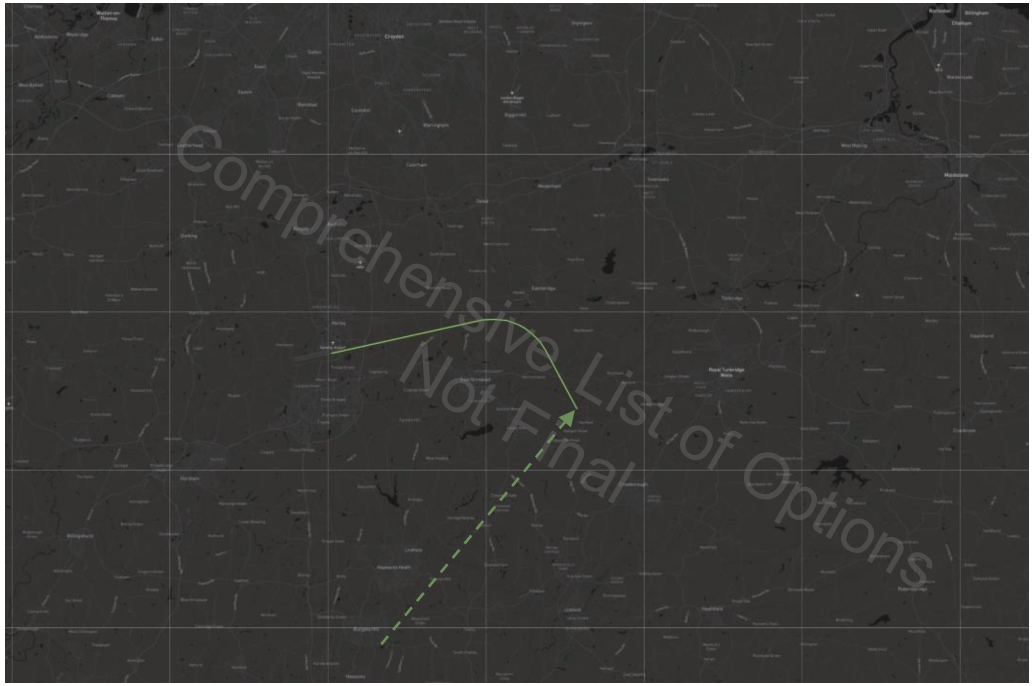
The population newly overflown overflight contours were used to identify the high performing notional flight paths that could be used to define a vectoring area. This is an initial indicative vectoring area subject to change as we engage with ATC and the upper network as the ACP progresses.







8. COMPREHENSIVE LIST OF OPTIONS



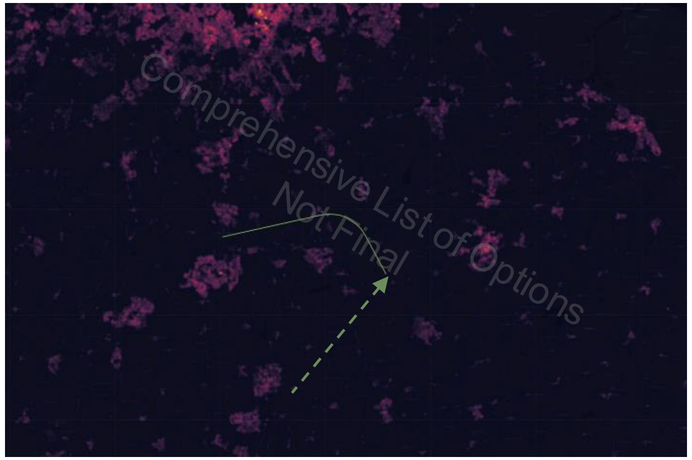
Westerly Arrival Option C (WAC)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP6 DP8

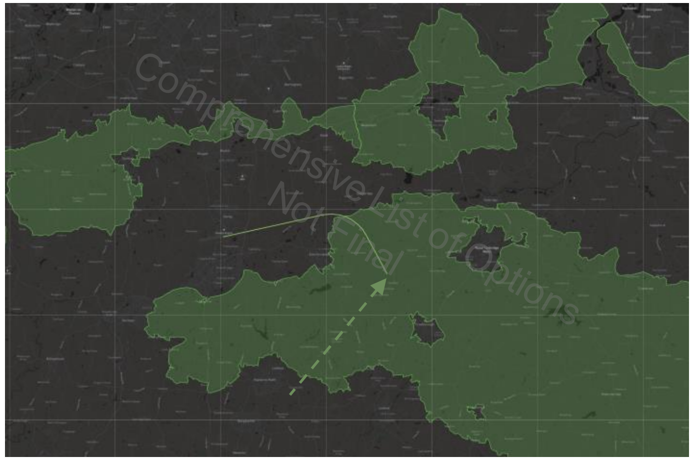
This arrival option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising total population overflown.

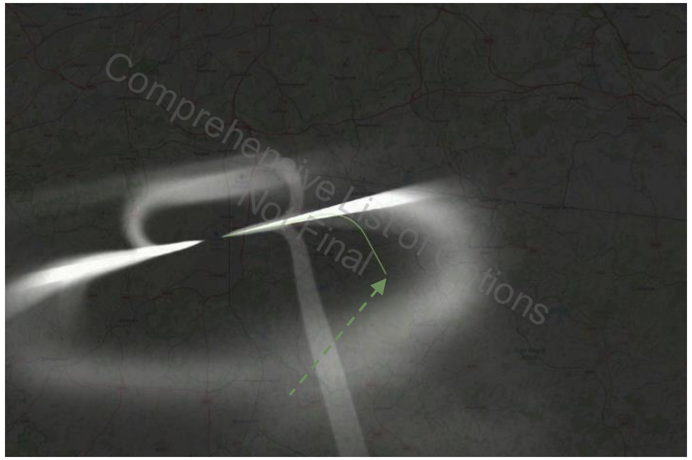
To first meet DP3, we have identified high performing notional flight paths using the ‘total population overflown metric for paths between 0-4000ft. A check against areas of AONB was also undertaken.

To achieve the aims of DP6, from 4000ft the option will then route directly from the network entry point (green dashed lines). We will use map population and other map underlays to make minor adjustments to the path with regards to noise. This option will evolve as more information around the airspace above 7000ft is shared from NERL.

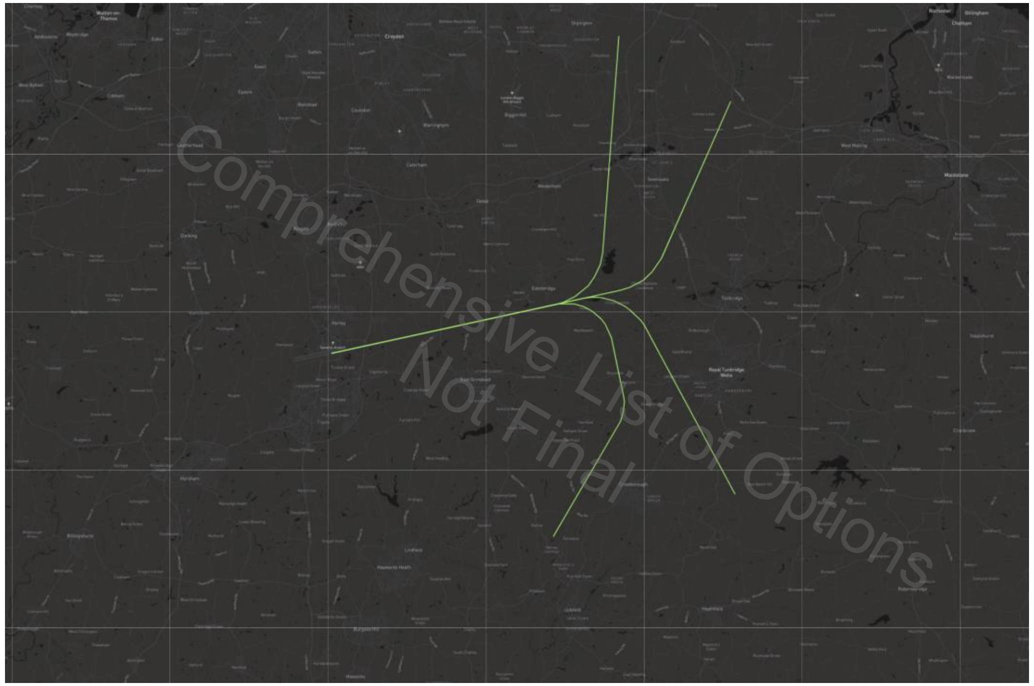
We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (WAB) in certain traffic scenarios.







8. COMPREHENSIVE LIST OF OPTIONS

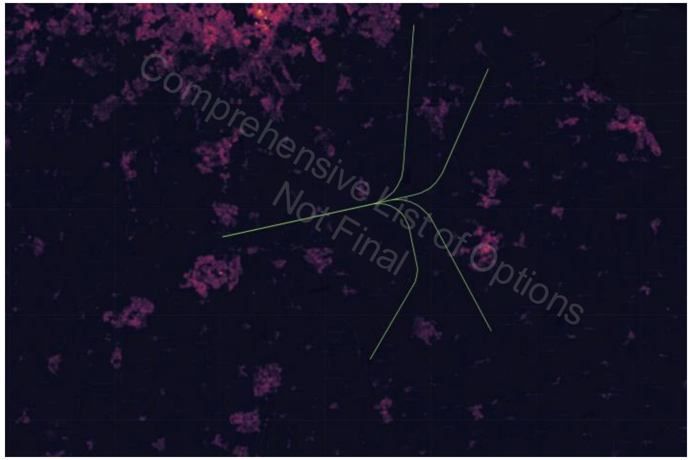


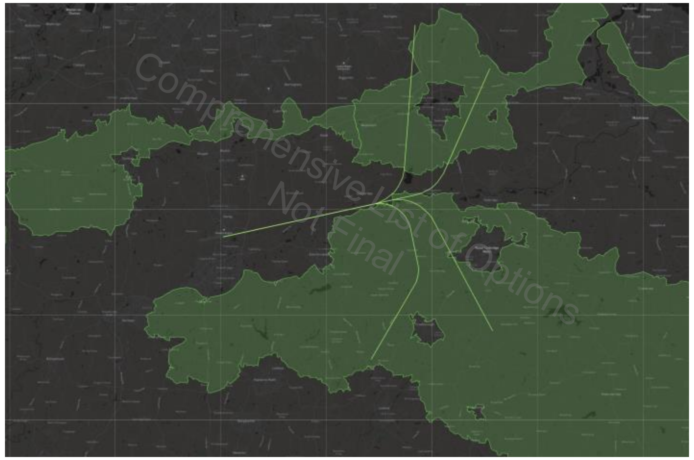
Westerly Arrival Option E (WAD)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

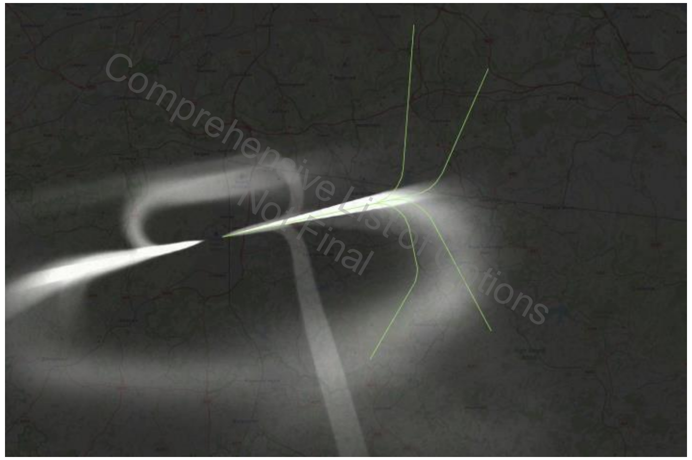
This arrival option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimise total population overflown.

We've used the total population overflown metric as the primary metric to identify notional flight paths that could be used in combination to provide respite. This arrival option avoids AONBs. The three paths selected could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution of noise (FED) study is completed.

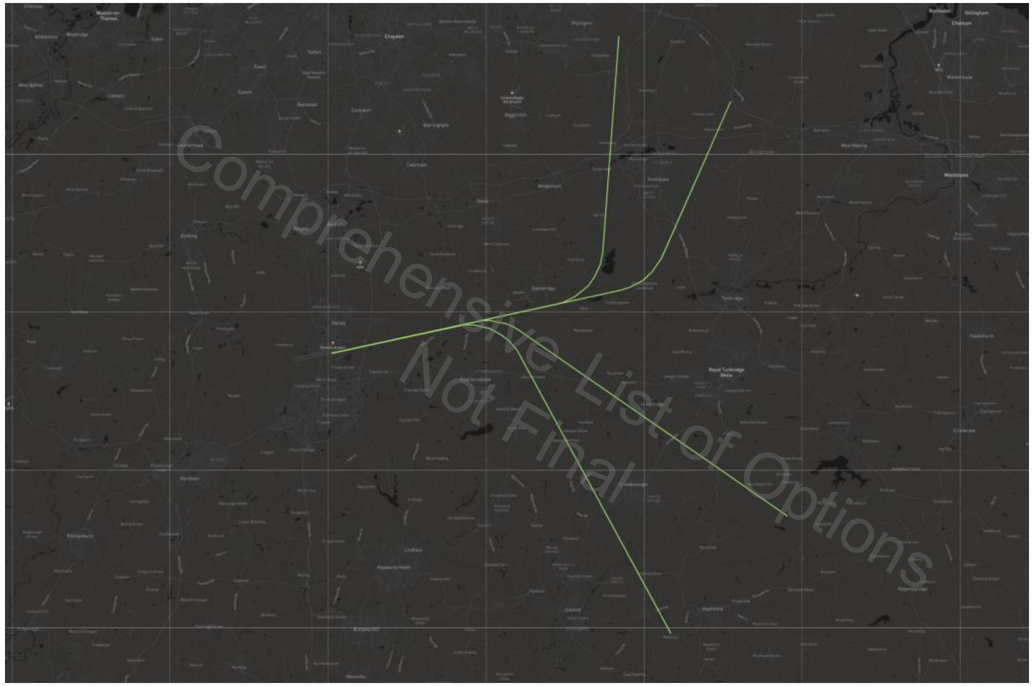
We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (EAB) in certain traffic scenarios.







8. COMPREHENSIVE LIST OF OPTIONS



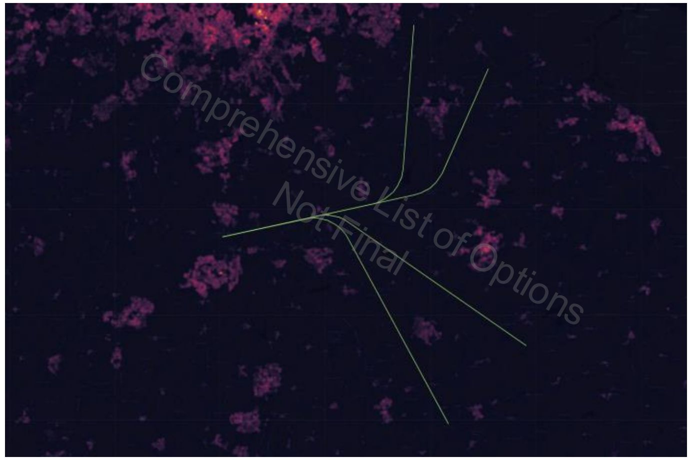
Westerly Arrival Option E (WAE)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

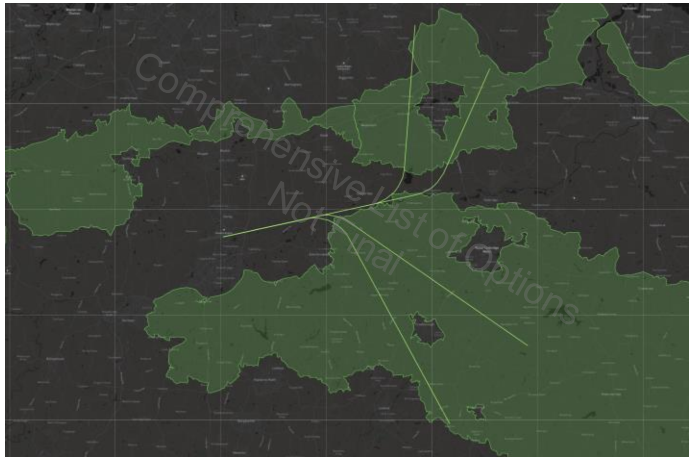
This arrival option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimising total population overflown.

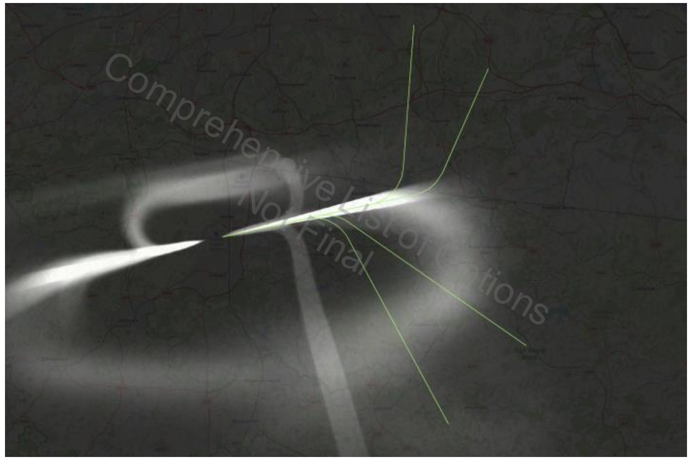
We've used the total population overflown metric as the primary metric to identify notional flight paths that could be used in combination to provide respite. When we've looked at the data, two sets of path performed comparatively well and therefore we have split them into two respite options WAD and WAE.

The four paths could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution of noise (FED) study is completed.

We anticipate that at the point of implementation, the technology required from the upper airspace network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (WAB) in certain traffic scenarios.





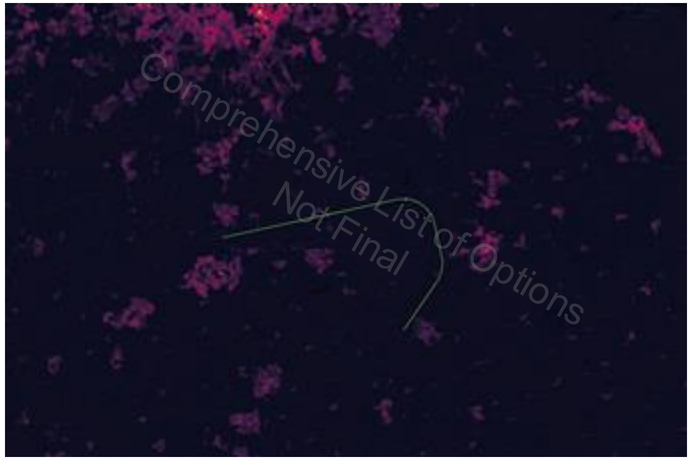


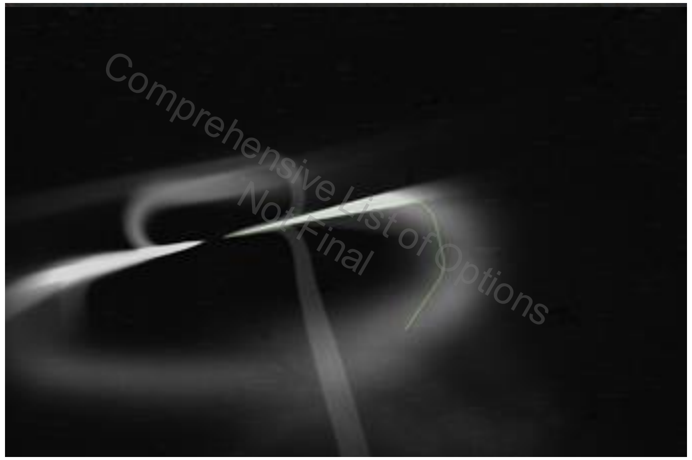
8. COMPREHENSIVE LIST OF OPTIONS

Westerly Arrival Option F (WAF)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

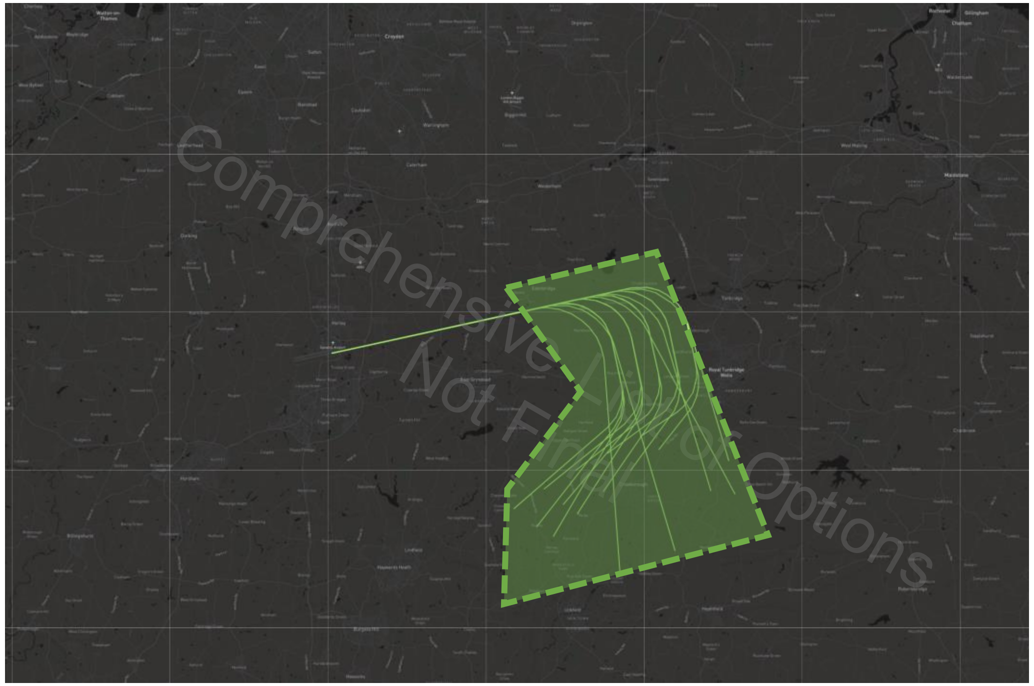
This system option focuses on meeting DP3 (limit adverse noise effects) and minimising population newly overflown. As the SEL data sits along the final approach track, the primary metric used to identify the high performing notional flight path is based on population newly overflown overflight contours and data around existing arrival flight paths.

We anticipate that at the point of implementation, the technology required from the upper network to facilitate single track PBN arrivals during periods of high traffic will not be available. We have therefore used the data around the highest performing notional flight paths to identify a vectoring area that would be used by controllers in certain traffic scenarios (WAG).





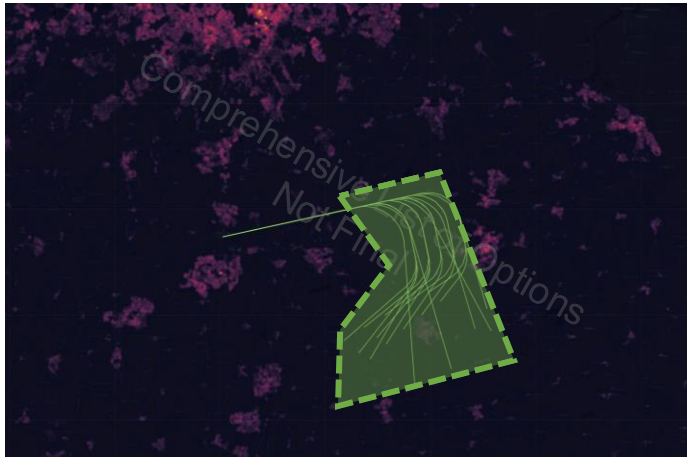
8. COMPREHENSIVE LIST OF OPTIONS

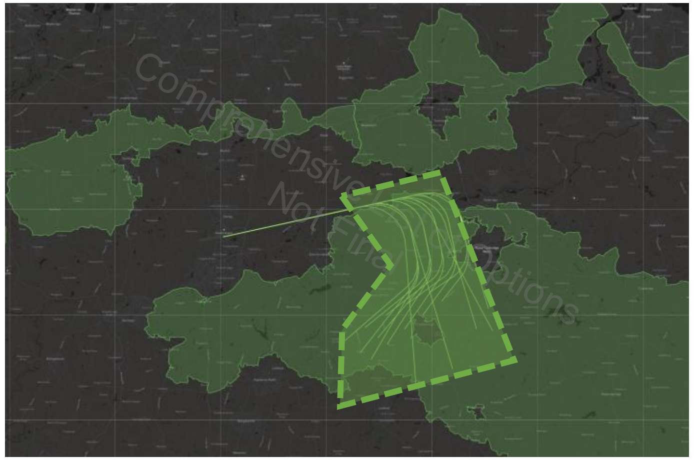


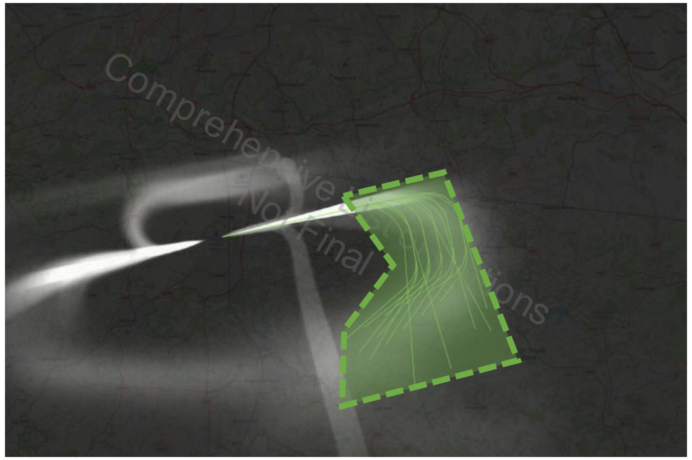
Westerly Arrival Option G (WAG)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This arrival option focuses on meeting DP3 (limit adverse noise effects) and minimising population newly overflown. It is intended it would be used in combination with a PBN option.

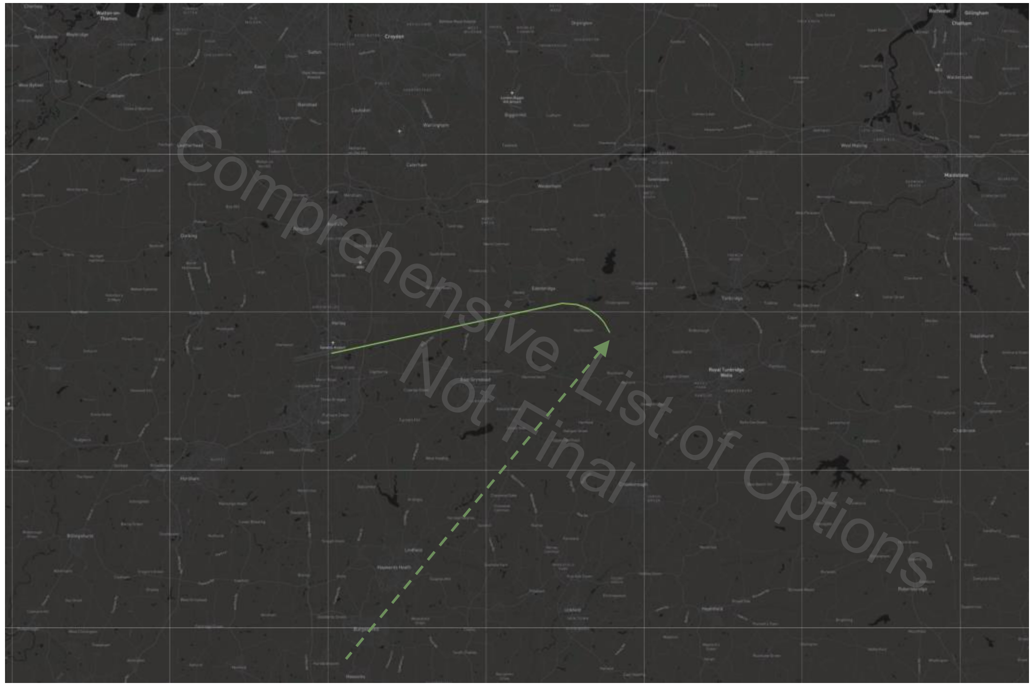
The population newly overflown overflight contours were used to identify the high performing notional flight paths that could be used to define a vectoring area. This is an initial indicative vectoring area subject to change as we engage with ATC and the upper network as the ACP progresses.







8. COMPREHENSIVE LIST OF OPTIONS



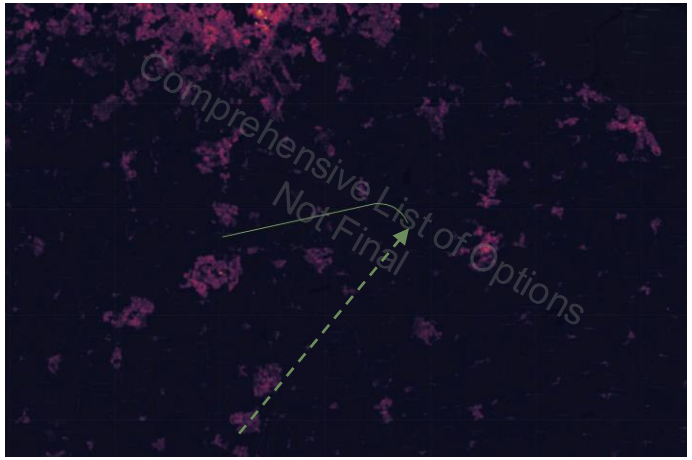
Westerly Arrival Option H (WAH)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

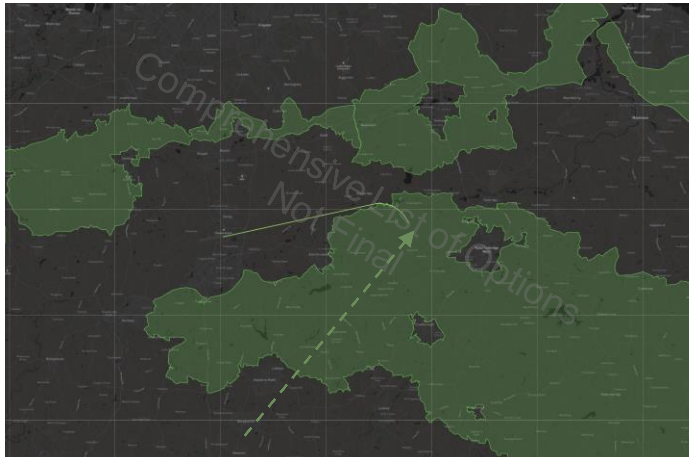
This arrival option focuses on meeting DP3 (limit adverse noise effects), DP6 (optimise use of aircraft capabilities) and minimising population newly overflown.

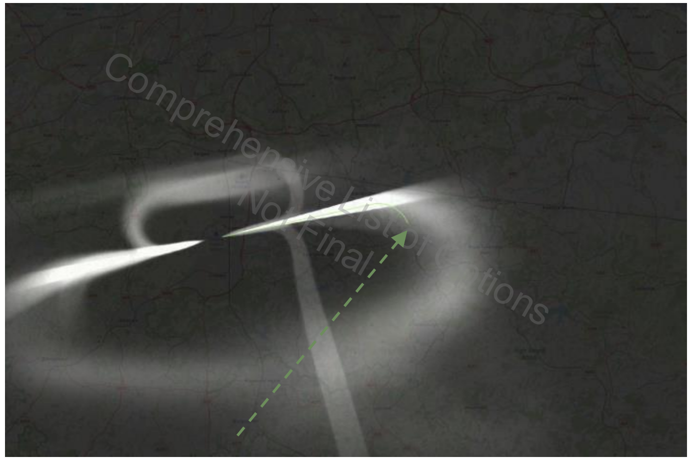
To first meet DP3, we have identified high performing notional flight paths using the population newly overflown contours between 0-4000ft. A check against areas of AONB was also undertaken.

To achieve the aims of DP6, from 4000ft the option will then route directly from the network entry point (green dashed lines). We will use existing overflight map underlays to make minor adjustments to the path. This option will evolve as more information around the airspace above 7000ft is shared from NERL.

We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (WAG) in certain traffic scenarios.







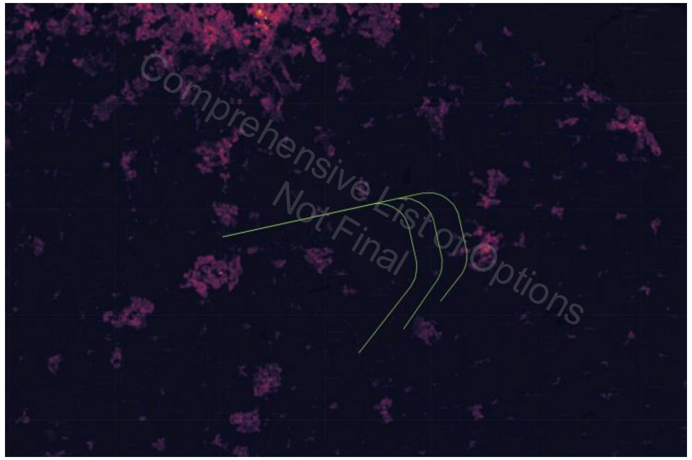
8. COMPREHENSIVE LIST OF OPTIONS

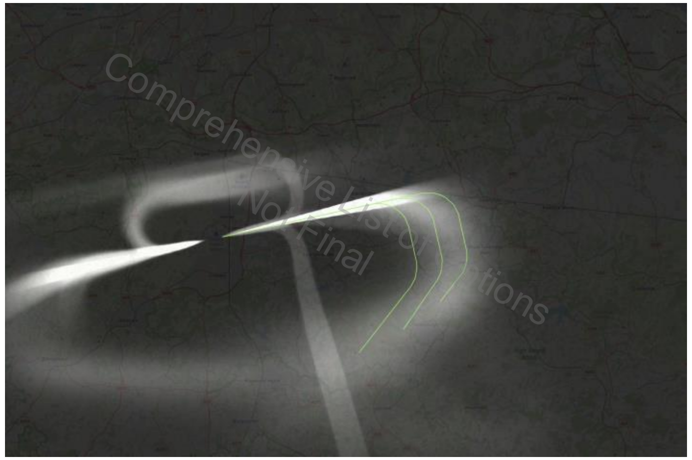
Westerly Arrival Option I (WAI)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

This arrival option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimise population newly overflown.

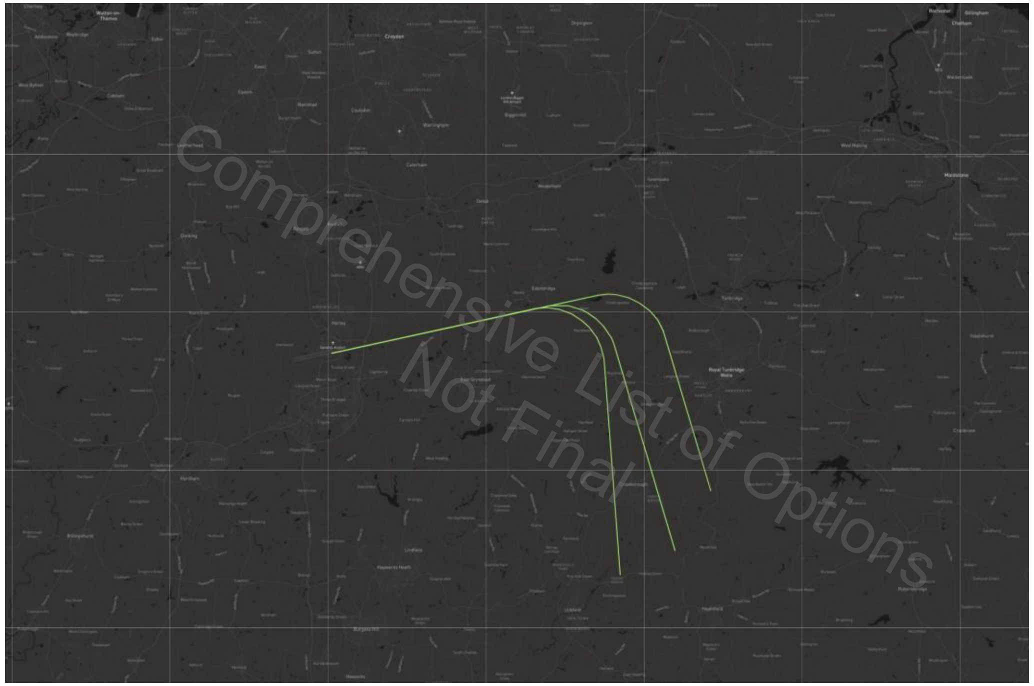
We've used the population newly overflown contours as the primary metric to identify notional flight paths that could be used in combination to provide respite. The paths selected could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution of noise (FED) study is completed.

We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (WAG) in certain traffic scenarios.





8. COMPREHENSIVE LIST OF OPTIONS

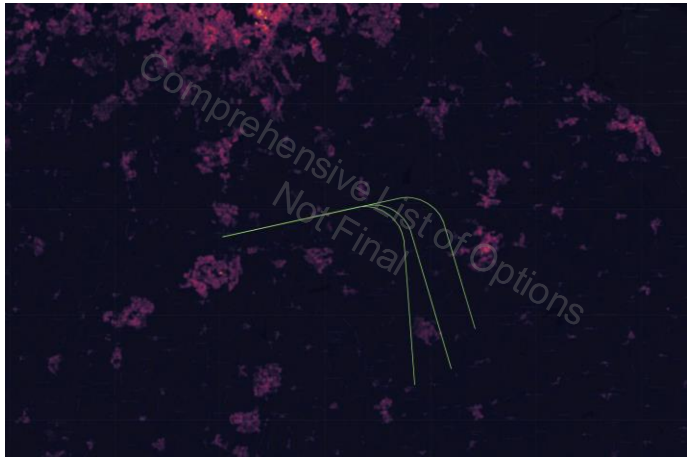


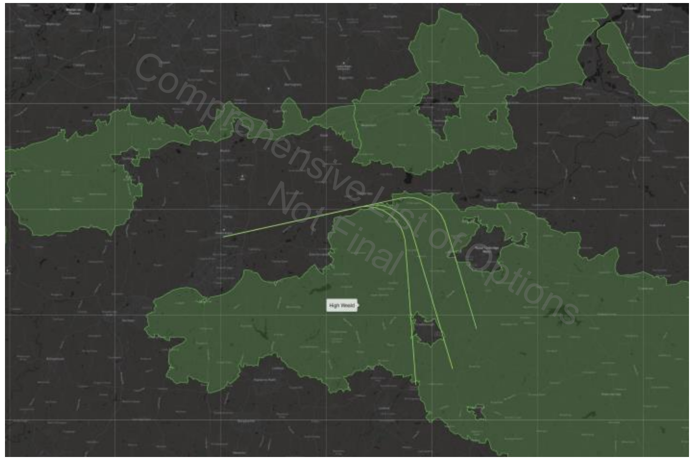
Westerly Arrival Option J (WAJ)	
Aims to meet	DP1 DP2 DP3 DP4 DP5 DP8

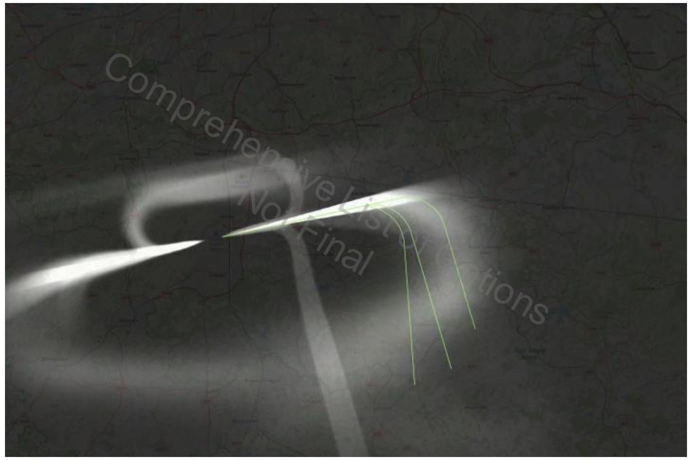
This arrival option aims to met DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimise population newly overflown.

We've used the population newly overflown contours as the primary metric to identify notional flight paths that could be used in combination to provide respite. The paths selected could be operated in various combinations to offer respite and we will explore this more once the outcome of the Fair and Equitable Distribution (FED) study is completed.

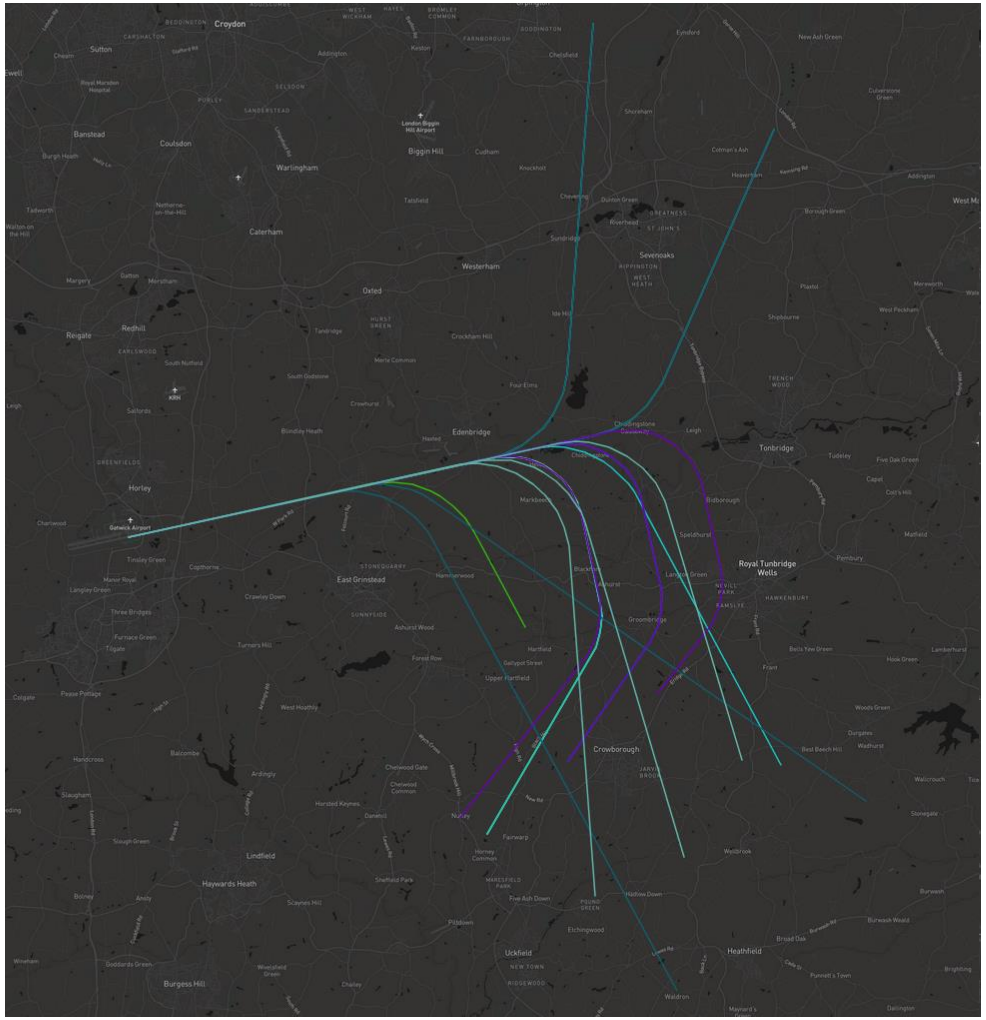
We anticipate that at the point of implementation, the technology required from the upper network to facilitate PBN arrivals during periods of high traffic will not be available. This option may therefore have to be used in combination with a vectoring area (WAG) in certain traffic scenarios.







8. COMPREHENSIVE LIST OF OPTIONS



All Westerly Arrival Options

The following image shows all the **PBN** Westerly Arrival Options shown on the previous slides on one image for comparison purposes.

6. THIS ENGAGEMENT (OUR QUESTIONS)

We are seeking feedback on the following:

1. Is the list of options sufficiently comprehensive (is anything missing)?
2. Is the list of options developed in line with the design principles?
3. Are there any other considerations that we should take into account regarding the development of a comprehensive list of options for the ACP?

A feedback form will be shared following the final workshop on the 23rd of February. We will use your feedback to refine, and where appropriate, develop further options.

Please submit your feedback form by Friday 25th March.

If you have any questions please contact us using LGWairspace.FASIS@gatwickairport.com

Please note that feedback must be submitted via the form.

7. NEXT STEPS

- Following the feedback period, we will collate and review all responses and refine or create new options as appropriate. We will then commence the Design Principle Evaluation (DPE) where we examine how well each option meets the Design Principles defined in Stage 1.

- The DPE will involve a qualitative evaluation of each option's performance against each individual Design Principle, when considered in isolation, which includes a description of how the option has either; Met, Partially Met, or Not Met each principle. An assessment of each option against the Design Principles, when considered as a set, and the rationale for taking forward an option for further appraisal will also be included in the DPE.

- The main output of the evaluation is a shortlist of viable options to be assessed in further detail as part of the Initial Options Appraisal.

- We will provide further details of the DPE as part of the next round of engagement sessions and it will also be documented as part of our Stage 2A submission documents which will be published on the CAA's Airspace Change Portal.

7. NEXT STEPS

Thank you

YOUR LONDON AIRPORT
Gatwick

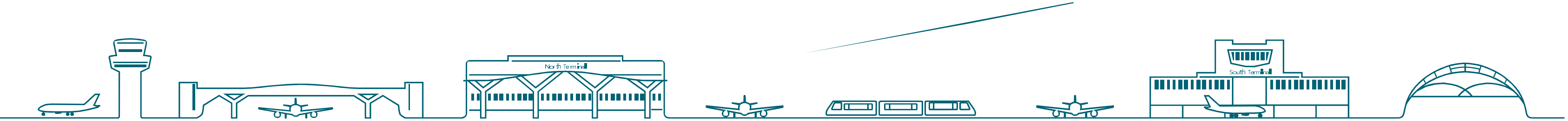
Gatwick Airport FASI South Airspace Change Proposal

Update for stakeholders on the development and assessment of airspace change design options during Stage 2 of the CAP1616 process

Virtual Briefing Session

23rd 24th and 28th June 2022

Version v1.0



1. WELCOME & INTRODUCTIONS

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

Presenters for today's briefing

- Goran Jovanovic – Airspace Change Manager, Gatwick Airport Limited
- Andy Sinclair - Head of Airspace Strategy and Engagement, Gatwick Airport Limited
- Chris Barnes – Director, Trax International Limited
- Nichola Shaw – Consultant, Trax International Limited

The slides will be circulated following the meeting

1. WELCOME & INTRODUCTIONS

- The slides will be circulated following the meeting along with a record of the key points raised by participants and all questions and answers.
- We will pause regularly during the presentation to take feedback and questions.
- Please raise your virtual hand using the functionality in MS Teams if you would like to make a contribution, rather than putting questions in the chat.

Thank you.

AGENDA 1 HOUR, 30 MINUTES

1. Welcome and introductions	5 minutes
2. Update on the overall timeline for the GAL FASI ACP	5 minutes
3. CAP1616: Stakeholder Engagement & Consultation Recap	20 minutes
4. Update on the development of the Comprehensive List of Options	40 minutes
5. Information on the Design Principle Evaluation	15 minutes
6. Next steps	5 mins

2. OVERALL ACP TIMELINE UPDATE

The GAL FASI ACP is progressing through Stage 2 of the CAP1616 process, developing and assessing options for the airspace change.

The methodology addresses the requirements laid out in Stage 2 of CAP1616

Step 2A: Develop a Comprehensive List of Options and evaluate them against the Design Principles to narrow down to a **shortlist**.

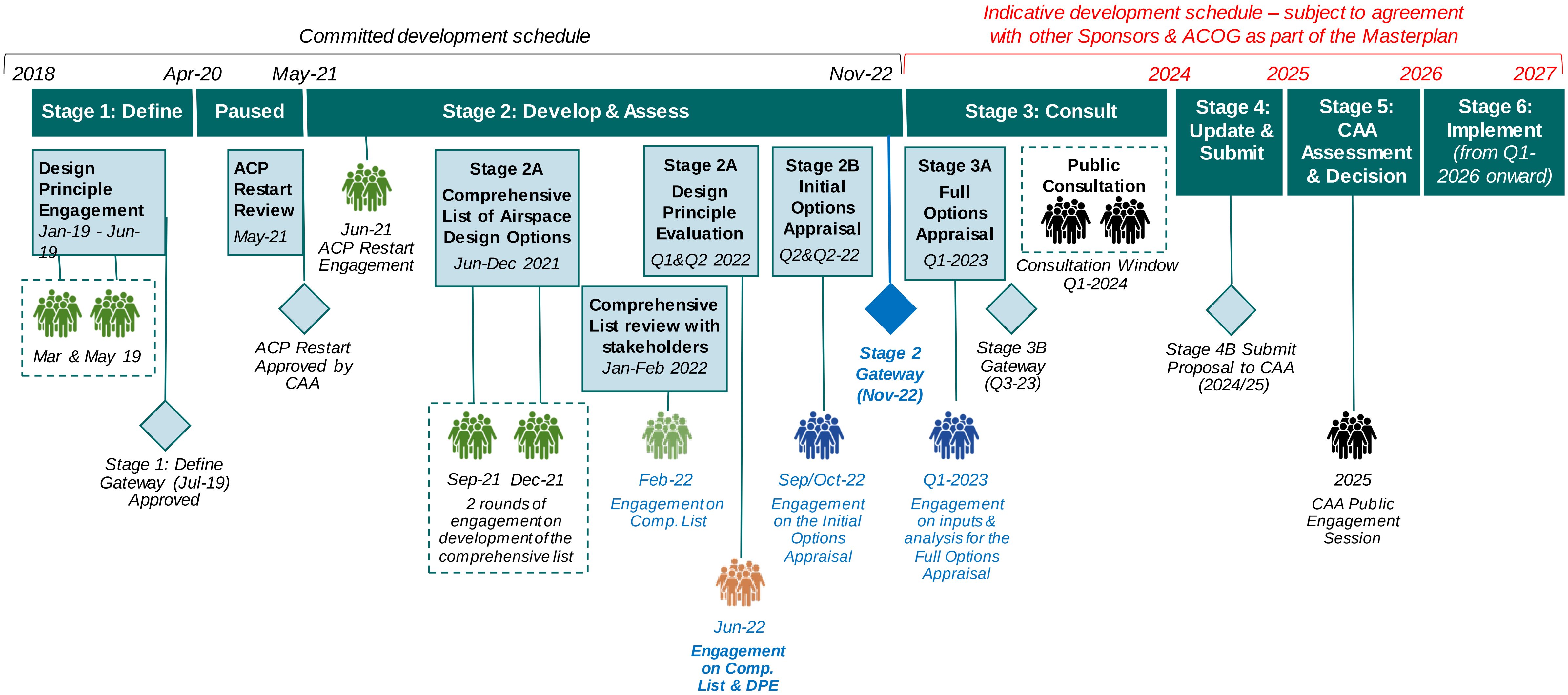
Step 2B: Conduct an Initial Appraisal of the options on the **shortlist.**

The Initial Options Appraisal is the 1st of 3 phases of appraisal required to refine the options and introduce progressively more detail to the analysis of costs and benefits:

Stage 2: Develop and Assess	*Stage 3: Consult*	*Stage 4: Update and Submit*
Initial Options Appraisal Largely qualitative assessment of the shortlisted options to highlight the relative impacts, both positive and negative	**Full Options Appraisal** A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms where possible	**Final Options Appraisal** The full appraisal updated and refined based on the output of the Stage 3 formal consultation with stakeholders

2. OVERALL ACP TIMELINE UPDATE

The following diagram shows the extended Stage 2A timeline within the overall ACP timeline:



2. OVERALL ACP TIMELINE UPDATE

We have extended our timeline to facilitate greater engagement with NATS, Airports and other stakeholders:

Sep to Dec 2021

- 1
- 1a. Define Sections of Airspace
- 1b. Flood with Notional Flight Paths
- 1c. Preliminary Assessment of the Notional Flight Paths
- 1

Jan to May 2022

- 2. Build a Comprehensive List of Options
- 2
- 3. Refine options using feedback and define the Do Nothing Scenario

Jun 2022

- 4. Conduct the Design Principle Evaluation to create a shortlist
- 3

Sep/Oct 2022

- 5. Initial Appraisal of the shortlisted options
- 3

- 6. Update the methodology for the Full Options Appraisal

Rounds of engagement during stage 2

1

Engagement to gather feedback on the methodology that we intend to follow to develop and assess airspace change design options during Stage 2.

Stakeholder update on the progress towards building a Comprehensive List of Options, integration with the Masterplan and technology / operational concepts.

2

Engagement to gather feedback on the development of a first Comprehensive List of Options for the ACP.

3

Engagement on how the outputs of the engagement have shaped the options on the comprehensive list. Our approach to the Design Principle Evaluation.

Engagement to present the outputs of the Initial Options Appraisal and gather feedback on how we should refine the appraisal further and consult on the options in Stage 3.

CAP1616 ENGAGEMENT AND CONSULTATION RECAP

The following slides provide an overview of the stakeholder engagement and consultation activities that form part of CAP1616:

Stage 1	**ACP Sponsors develop a set of Airspace Design Principles through engagement with a targeted group of stakeholder representatives. The design principles are used to guide the development and assessment of airspace design options for the ACP.** Gatwick passed the Stage 1 Gateway in July 2019 with 9 Design Principles
Stage 2 (Step 2A)	**ACP Sponsors develop a comprehensive list of airspace design options. These options are then tested with the same targeted group of representatives engaged during Stage 1, to ensure that they have been developed in line with the airspace design principles.** • During the previous engagement activity from February to May 2022, we presented our comprehensive list of options and asked for feedback. • Options may be amended and additional options added to the list in response to the feedback generated by the engagement. • This briefing will summarise where options have been amended and where additional options have been added to the comprehensive list.

CAP1616 (C12): Earlier in the process, as there will not be clarity on the precise impacts of a proposed change, it will be more challenging to identify potential audiences with whom to engage on this process. **It is therefore likely that contact will primarily be with stakeholders' representatives**: community leaders; local authorities elected representatives; airport consultative committees; representative groups; governmental organisations; and industry groups. These will likely be a more informed audience, and will often be people with whom the proposer has an ongoing relationship, helping to contextualise the engagement and developing proposal.

CAP1616 ENGAGEMENT AND CONSULTATION RECAP

Stage 2 (Step 2A cont)

All options on the comprehensive list are subject to a Design Principle Evaluation to understand how well each option aligns to the principles. This high level evaluation provides the first opportunity in the process to start shortlisting options for further assessment.

- This briefing will provide stakeholders with more information about our approach to the Design Principle Evaluation
- There is no specific requirement in the CAP1616 process to conduct engage activities with the same representative stakeholders but we think it is important that stakeholders understand the approach being followed.
- The breadth of stakeholders that are engaged in the process will begin to expanded steadily in Step 2B and Step 3A as we build a better understanding of impacts.

CAP1616: Engagement is a catch-all term for developing relationships with stakeholders, covering a variety of activities including but not limited to consultation, information provision, regular and one-off meetings and forums, workshops and town hall discussions.

Throughout Stage 2 options may change as they may develop and evolve as more information becomes available.

CAP1616 ENGAGEMENT AND CONSULTATION RECAP

Stage 2 (Step 2B)

ACP Sponsors conduct an Initial Options Appraisal (IOA) based on the shortlist of options arising from the Design Principle Evaluation.

- The IOA is the first in a three-phase options appraisal and is a mainly qualitative assessment of the shortlisted options against several standard categories and criteria outlined in CAP1616.
- We expect to conduct the IOA for the Gatwick's FASI-S ACP between July and September 2022.
- Similar to the Design Principle Evaluation, there is no specific requirement in the process to engage stakeholders in the IOA activity but we think it is important to discuss the approach and outcomes with stakeholders.
- This additional round of engagement will take place in September 2022 and include the same targeted group of stakeholder representatives, along with a dedicated workshop for Parish Councils.
- The outcomes of the IOA will inform how our stakeholder engagement is broadened in Step 3A, based on a better understanding of the potential impacts of the shortlisted options.

CAP1616 (C29): *Within the development of the options appraisal during Step 2B, the key impacted audiences will be far more clearly identified. This insight should be used to inform the development of the consultation strategy in Stage 3.*

CAP1616 ENGAGEMENT AND CONSULTATION RECAP

Stage 3

ACP Sponsors prepare for and undertake a full public consultation. Stage 3 is broken down into four steps:

Step 3A Consultation preparation: The ACP Sponsor plans for public consultation and prepares the key materials, including a Full Options Appraisal that provides more rigorous evidence regarding the quantitative impacts of the options.

As part of the wider FASI-S Programme, we will examine the interdependencies and trade-offs with the proposals from neighbouring airports and NATS as part of the Full Options Appraisal.

Step 3B Consultation approval
The CAA reviews the sponsors consultation strategy to ensure it is clear, comprehensive, objective and the materials are accurate and accessible.

Step 3C Commence consultation

Step 3D Collate and review responses
Consultation responses are collated, reviewed and categorised. The outcomes are published publicly on the CAA' Airspace Change Portal.

CAP1616: Consultation is a formal process seeking input into a decision, undertaken in line with the Gunning principles and government guidance.

CAP1616 ENGAGEMENT AND CONSULTATION RECAP

Stage 4	**Step 4A Update design** The ACP Sponsor considers the consultation responses, identifies any consequent design changes, and undertakes a Final Options Appraisal. If there is a fundamental change to the design, the sponsor may be required to undertake a further targeted public consultation about the areas that have changed. **Step 4B Submit airspace change proposal to CAA** The ACP Sponsor prepares the formal airspace change proposal and submits it to the CAA.
Stage 5	**Step 5A CAA assessment** The CAA reviews and assesses the ACP and may choose to hold a Public Evidence Session. **Step 5B CAA decision** The CAA decides whether to approve or reject the ACP. For Level 1 changes, where there are potential noise impacts below 7000ft, the CAA will normally seek views on a draft of the decision. Alternatively, the Secretary of State may 'call-in' the proposal and make the decision, and the CAA will instead give the Secretary of State a 'minded to' decision

CAP1616 ENGAGEMENT AND CONSULTATION RECAP

CAP1616 follows a deliberative approach to ACP development. Stakeholders are engaged as representatives in the early stages of the process, to participate in options development and influence the way the proposal progresses.

The early stages can become unmanageable if too many stakeholders participate because there are such a wide range of options under consideration. As the process progresses, the breadth of stakeholders engaged steadily expands and the list of options is refined.

For this process to be effective, the early engagement must be open and transparent. Stakeholders should consider the information shared in the context of the wider process and recognise that the impacts of the options have yet to be fully appraised.

Replicating options development information selectively and out of context, with an inference that the specific content has been appraised is being proposed for consultation, risks undermining the later stages of the process and may confuse the wider public.

Please take care when reporting back to the wider stakeholder community that any ACP information used, is replicated fully, accurately and in context. Thank you.

FEEDBACK & QUESTIONS

COMPREHENSIVE LIST OF OPTIONS ENGAGEMENT

In February and March we engaged with representative stakeholders on our Comprehensive List of Options.

As part of the engagement we presented our initial Comprehensive List of 39 options.

We asked the following questions:

1. Is the list of options sufficiently comprehensive (is anything missing)?
2. Is the list of options developed in line with the design principles?
3. Are there any other considerations that we should take into account regarding the development of a comprehensive list of options for the FASI-S ACP?

We received 25 responses from the representative stakeholder group.

COMPREHENSIVE LIST OF OPTIONS ENGAGEMENT

In February and March we engaged on our Comprehensive List of Options.

The key themes arising from stakeholders' feedback that have influenced the comprehensive list are:

- Rural areas and Ambient Noise
- Westerly arrivals between 7nm and 10nm
- Arrival respite configurations with two routes
- Balance of total population overflown and newly overflown metrics

The following slides provide further details on how stakeholders' responses have influenced our Comprehensive List of Options. We've also included a summary of the feedback received at this stage which will be applied during the Options Appraisal later in the process.

The Stakeholder Engagement report will include a response to each piece of feedback received.

Summary of feedback that influenced our Comprehensive List of Options

Rural Areas and Ambient Noise

You said: We should consider the noise impacts in rural areas. Communities in rural areas, where ambient noise is typically lower, may be more acutely affected by aircraft noise events than people in urban areas with higher ambient noise levels.

We did: We have looked at the data publicly available which we could use to develop options that aim to balance impacts to rural populations and areas of lower ambient noise. Subsequently, we have taken DEFRA's strategic noise mapping for roads and railways as a source of ambient road and rail noise data. This mapping is based on L_{Aeq} day time and night-time contours.

There is typically a correlation between populated areas and noise from road/rail infrastructure so we believe this data will achieve a balance between high ambient noise, population overflown, and impacts in rural areas.

The measurement of ambient noise is complex and there is not any specific regulation or legislation that offers guidance on how sponsors should take ambient noise into account when developing and assessing options as part of an airspace change.

It's important to note that the primary and secondary metrics used to assess Airspace Changes, do not account for ambient noise however there will be opportunities as part of the Initial and Full Options Appraisal to assess against any applicable outputs from the FED Study

Summary of feedback that influenced our Comprehensive List of Options

Rural Areas and Ambient Noise (We did)

We've used a map underlay of the data to develop options. These options aim to overfly the areas experiencing higher levels of ambient noise as shown in the red, yellow and green parts of the map opposite.

Sometimes, it's unavoidable to fly over areas with lower levels of ambient noise because of the requirements for the design of flight paths, so we have developed a number of configurations which aim to meet the feedback from stakeholders.

When developing these options, we have followed the same methodology used when developing the other airspace options within the Comprehensive List.

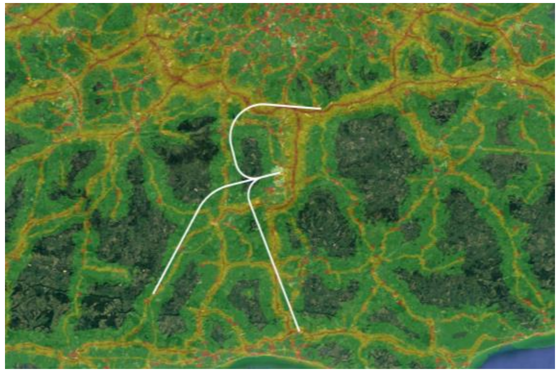
Data source: https://ssi.noiseconsultants.co.uk/

COMPREHENSIVE LIST OF OPTIONS ENGAGEMENT

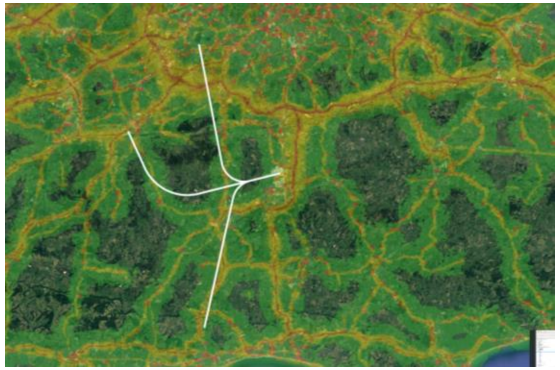
Summary of feedback that influenced our Comprehensive List of Options

Rural Areas and Ambient Noise (We did) – Westerly Departures

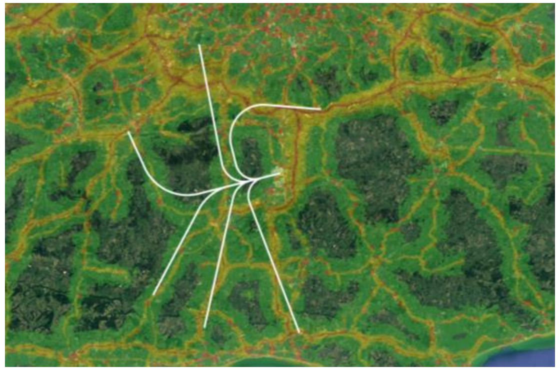
Westerly Departure J (WDJ)



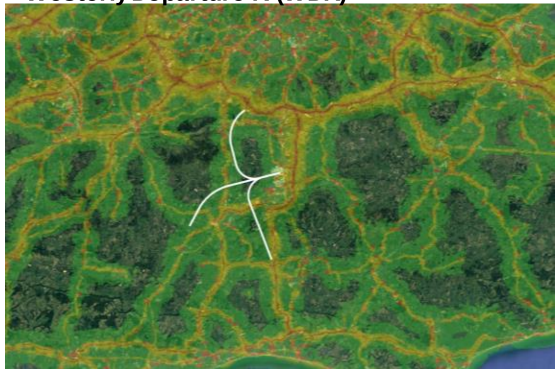
Westerly Departure L (WDL)



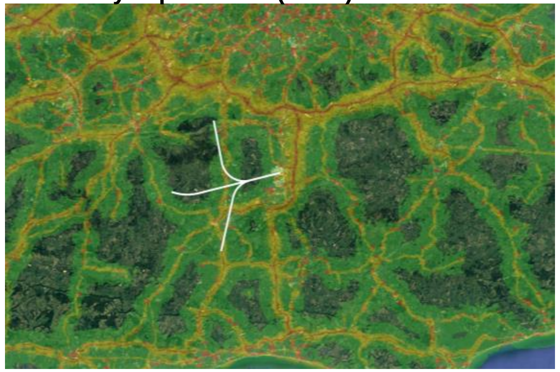
Westerly Departure N (WDN)



Westerly Departure K (WDK)



Westerly Departure M (WDM)



WDJ: Ambient noise 0-7000ft

WDK: Ambient noise 0-4000ft, aircraft to fly direct to network exit from 4-7000ft with small adjustments

WDL: Ambient noise 0-7000ft

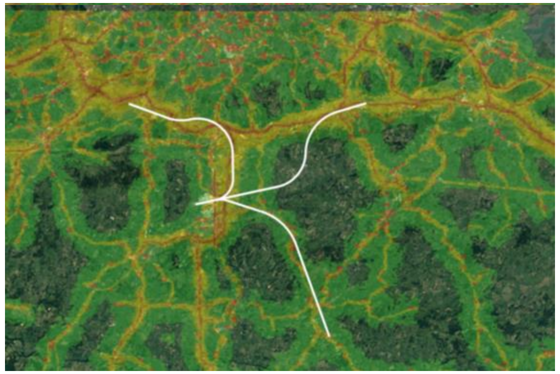
WDM: Ambient noise 0-4000ft, aircraft to fly direct to network exit from 4-7000ft with small adjustments

WDN: Respite configuration (Period 1: WDJ and Period 2: WDL)

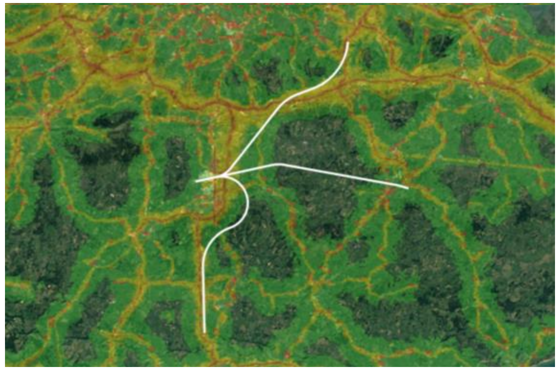
Summary of feedback that influenced our Comprehensive List of Options

Rural Areas and Ambient Noise (We did) – Easterly Departures

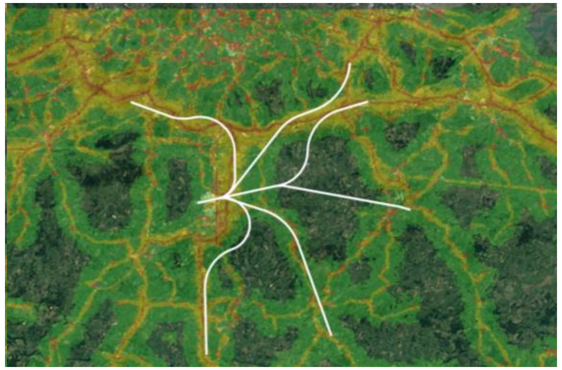
EDK



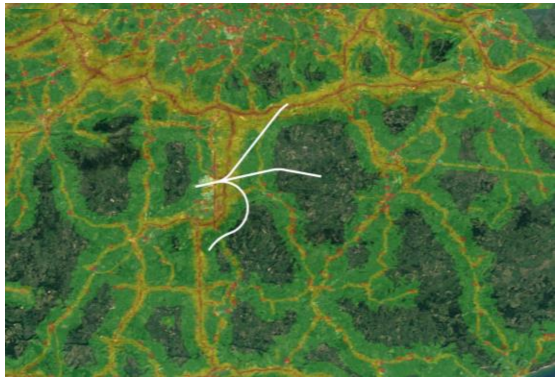
EDM



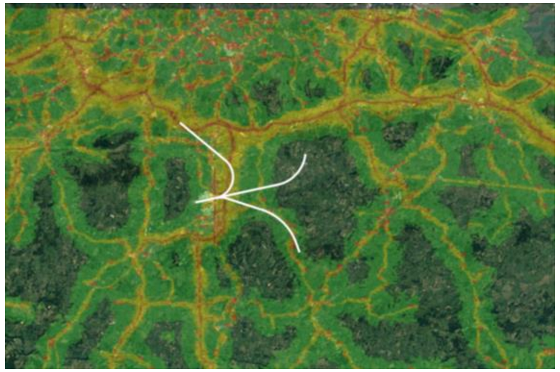
EDO



EDL



EDN



EDK: Ambient noise 0-7000ft

EDL: Ambient noise 0-4000ft, aircraft to fly direct to network exit from 4-7000ft with small adjustments

EDM: Ambient noise 0-7000ft

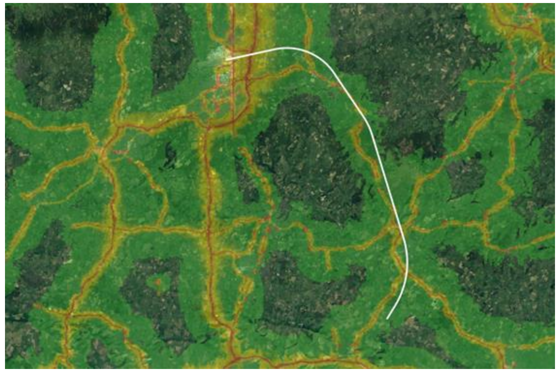
EDN: Ambient noise 0-4000ft, aircraft to fly direct to network exit from 4-7000ft with small adjustments

EDO: Respite configuration (Period 1: EDK and Period 2: EDK)

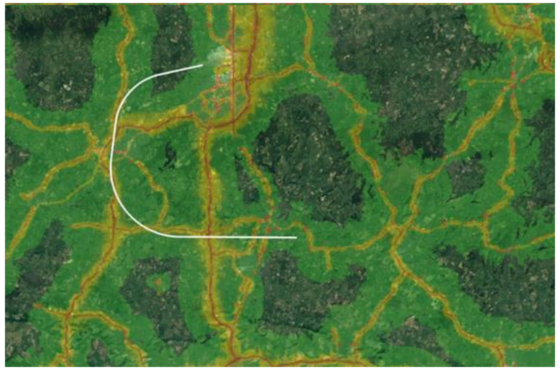
Summary of feedback that influenced our Comprehensive List of Options

Rural Areas and Ambient Noise (We did) – Easterly and Westerly Arrivals

WAP



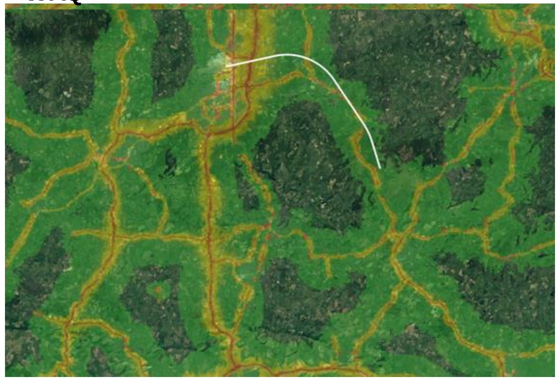
EAO



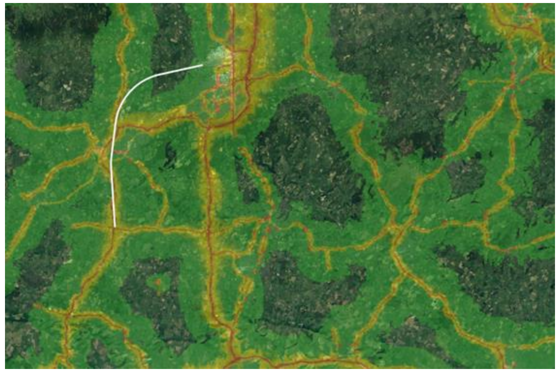
These arrival options would utilise a type of PBN called RNP-AR.

Not all aircraft and crews are able to fly RNP-AR and therefore these routes would need to be operated alongside other arrival options.

WAQ



EAP



WAP: Ambient noise 0-7000ft

WAQ: Ambient noise 0-4000ft, aircraft to fly direct to from network entry from 4-7000ft with small adjustments

EAO: Ambient noise 0-7000ft

EAP: Ambient noise 0-4000ft, aircraft to fly direct to from network entry from 4-7000ft with small adjustments

Summary of feedback that influenced our Comprehensive List of Options

Balance of newly overflown and total population overflown

You said: There should be options that use the outputs from the airspace design database to aim to balance total population overflown and population newly overflown.

We did: We've revisited the airspace design database, following the same methodology used previously, and developed additional options that aim to balance total population overflown and population newly overflown.

COMPREHENSIVE LIST OF OPTIONS ENGAGEMENT

Summary of feedback that influenced our Comprehensive List of Options

Balance of newly overflown and total population overflown

Westerly Departure O (WDO)

Easterly Departure P (EDP)

Westerly Arrival N (WAN)

Easterly Arrival M (EAM)

Westerly Departure P (WDP)

Easterly Departure Q (EDQ)

Westerly Arrival O (WAO)

Easterly Arrival N (EAN)

Summary of feedback that influenced our Comprehensive List of Options

Westerly Arrivals that join the final approach between 7nm to 10nm

You said: We should investigate westerly arrivals between 7nm and 10nm as part of the Comprehensive List of Options.

We did: All of our arrival options developed are based on outputs from the airspace design database; in the case of the westerly arrivals, the data within the database did not suggest to locate a flight path within this joining area.

Following the feedback, we have looked at all the notional flight paths that only join between 7nm and 10nm and we've used data within the database to identify the comparatively higher performing flight paths. As there was also feedback around balancing population newly overflown and total population overflown, we have aimed to balance these two considerations when using the airspace design database to select a notional flight path.

Summary of feedback that influenced our Comprehensive List of Options

Two track respite arrival options

You said: We should develop two route arrival respite options.

We did: We have developed additional arrivals options that are configured using two PBN routes. As we also received feedback around balancing population newly overflown and total population overflown, we have aimed to balance these two considerations when using the airspace design database when selecting the notional flight paths.

EAK

EAL

WAM

Summary of feedback that influenced our Comprehensive List of Options

Following the stakeholder engagement, our Comprehensive List of Options now comprises of:

17 westerly departure options
18 easterly departure options
18 westerly arrival options
17 easterly arrival options

This increases the total number of options from 39 to 70.

Alongside the feedback that has influenced our comprehensive list, we also received feedback which would apply later in the process that is summarised later in the presentation.

All 70 options on the comprehensive list will now be subject to a Design Principle Evaluation.

The Stakeholder Engagement report will include a response to each piece of feedback received.

FEEDBACK & QUESTIONS

Design Principle Evaluation

The Design Principle Evaluation (DPE) sets out how each option responds to the design principles.

- The next step in the CAP1616 process is to undertake a Design Principle Evaluation (DPE).
- The DPE includes a high level assessment of each option which outlines whether the design principle is 'not met', 'partially met' or 'met'.
- The DPE is the first opportunity we have in the process to shortlist options. As part of our Stage 2A submission, we are required to clearly set out the criteria used to evaluate the options against the design principles.
- The DPE is a relatively high-level, qualitative exercise, but must clearly set out how each option has performed against each Design Principle and why options have continued or been paused.
- As more information becomes available as we progress through the process, we may revisit some of the options paused as part of the DPE. This will always be documented and communicated with stakeholders.

Design Principle Evaluation

The Design Principle Evaluation (DPE) sets out how each option responds to the design principles.

- The below table shows an indicative example of a DPE methodology and categorisation:

#	Design Principle	Design Principle Description	DPE Methodology	Component	Met	Partially Met	Not Met
1	Safety by Design	Must at least maintain, and ideally enhance, aviation safety, by reducing or removing safety risk factors, provided enhancement does not have a detrimental impact on other benefits. (CORE)	Qualitative Subject Matter Expert (SME) evaluation of whether an option is expected to maintain, enhance or degrade safety. The assessment will consider current regulation, ATC standards, airline requirements, and any feedback received from industry stakeholders.	-	The option is expected to maintain or enhance safety.	The option is expected to maintain safety, however safety mitigations or processes may have to be explored to accommodate the option.	The option is expected to be detrimental to safety.

- Some Design Principles may be broken down into components; for example DP6 Optimise Use of Aircraft Capabilities could be assessed against two areas; track length and Continuous Climb/Continuous Descent operations.
- The outcome of the DPE is a matrix which shows each option's performance against each design principle, alongside an assessment of the overall performance and whether the option will be progressed or paused.

Design Principle Evaluation

The Design Principle Evaluation (DPE) sets out how each option responds to the design principles.

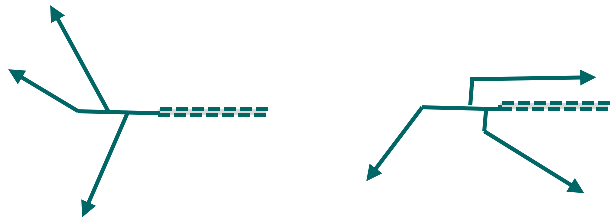
- As part of our previous engagement workshops, we explained that our options have been developed in isolation and options will evolve as we progress through the process and more information becomes available about the potential impacts and the interdependencies with other proposals.
- Alongside the shortlisting of some options which will take place once the DPE is complete, we expect that some options will either be refined or combined in order to take the better performing routes and build systems that would work with the interdependencies.
- The outputs of the DPE regarding the alignment of specific routes to the design principles will be used to guide how the higher performing aspects of different system options might be combined in pursuit of optimisation.

Design Principle Evaluation

The Design Principle Evaluation (DPE) sets out how each option responds to the design principles.

- This example is not based on Gatwick options or the outcomes of the Gatwick DPE, but provides an overview about how me may combine or refine options.

1. In this <u>example</u>, two options proceed to the DPE

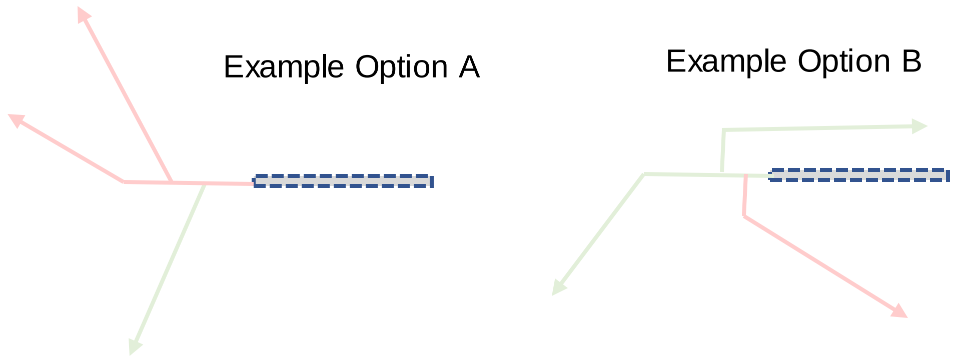


Example Option A

Example Option B

These options have been developed in isolation and will evolve as further information becomes available from neighbouring airports and the network above 7000ft as well as any information from the DPE.

2. The DPE finds that certain routes in an option perform better than others



As part of the DPE, a qualitative assessment of the options is undertaken. In some cases, some routes may be more viable that others and these are identified as part of the DPE.
In this case, the right turns in option A perform poorly, and the left turn in Option B also performs poorly. The other elements of the option perform well.

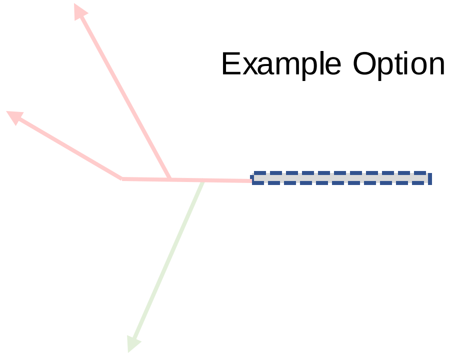
Design Principle Evaluation

The Design Principle Evaluation (DPE) sets out how each option responds to the design principles.

- This example <u>is not based on Gatwick options or the Gatwick DPE</u>, but provides an overview about how me may combine or refine options.

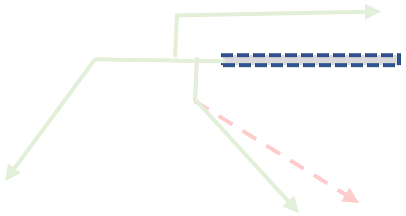
3. The outcomes of the DPE are used to refine or develop new options

Example Option A



Option A in its entirety is discontinued as overall the impacts of the two right turns outbalance any benefits of the left turn.

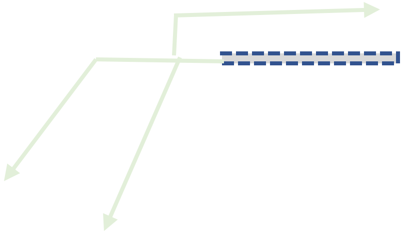
Example Option B_1



The left hand turn in Option B has the potential to be refined using the airspace design database. This option could evolve into Option B_1

and/or

Example Option C



The higher performing elements of the two options could be combined together to create a new option.

7. QUESTIONS AND ANSWERS

Summary of other engagement feedback received

Alongside the feedback that we could use to influence our Comprehensive List of Options, we also received feedback that we will use as part of the later stages of the process.

Our Stakeholder Engagement Report, which will be circulated to stakeholders in July, will include responses to each piece of feedback received.

Design Principle Evaluation

Summary of other engagement feedback received

You said (Summary themes)	We did
We should consider noise impacts to health and quality of life	Our options have been developed using outputs from the airspace design database. This database includes metrics which are indicators of the primary and secondary metrics that will be assessed later in the airspace change process. This includes Sound Exposure Level (SEL), which forms part of the L_{Aeq} calculations. Data from the L_{Aeq} contours is used as a primary metric in the airspace change process to assess impacts to health and quality of life. The Initial Options Appraisal will analyse impacts to these contours as well as reviewing secondary noise metrics such as N60 and N65 data, and overflight.
We should consider frequency of overflight and cumulative overflight	This will be evaluated as part of our Design Principle Evaluation and considered in further detail as part of the Initial Options Appraisal.
Flight paths should achieve continuous climb/descent (CCO/CDO)	All of the options are designed to achieve CCO/CDO to/from 7000ft. As part of the Design Principle Evaluation and Initial Options Appraisal, we will evaluate options potential for CCO/CDO.
We should consider noise sensitive sites and tranquil areas such as local nature reserves.	Noise sensitive sites such as schools, places of worship and hospitals will be assessed as part of the Initial Options Appraisal. The Initial Options Appraisal also includes assessments on tranquillity and biodiversity.
We should consider the NPRs	Some options within the Comprehensive List are based on the existing RNAV1 nominal tracks and therefore follow the existing NPRs. Other options do not follow the NPRs. At this stage, the benefits and impacts of each option haven't been assessed and we will consider impacts to the NPRs in further detail as part of the Initial Options Appraisal.
We should consider Controlled Airspace	Benefits and impacts to General Aviation and Controlled Airspace will be appraised as part of the Initial Options Appraisal.

Summary of other engagement feedback received

Baseline

You said: Feedback was received regarding the use of 2019 flight data in the airspace design database to examine populations newly overflown. Some feedback suggested that historic data should be used, incorporating those that were not overflown in earlier years.

We did: The Airspace Design Database contains 2019 data that has been adjusted to reflect the extant Route 4 procedure. This was selected as it aligned with the requirements of later parts of the CAP1616 process.

As part of Step 2A, we are required to define and assess a pre-implementation 'do nothing' baseline scenario. This scenario must take into account known or anticipated factors that might affect the baseline such as planned housing developments close to the airport, forecast growth in air traffic, or expected changes in airlines' fleet mix.

Our assessment of newly overflown must examine the populations that we expect will be overflown by the existing airspace design at the point when a change is implemented in 2026. At the point of implementation (2026 onwards), it is expected that Gatwick will have recovered from the impacts of COVID-19 therefore 2019 was chosen as it was a year which most reflected a scenario where the airspace, and traffic patterns, had recovered from the impacts of COVID-19. The 2019 data will be developed to reflect the known and anticipated factors when describing the pre-implementation scenario.

Next Steps

- We will share the updated Stakeholder Engagement Report in July 2022 that collates the outputs of all engagement conducted up to the completion of Step 2A.
- The next engagement workshops, concentrating on Step 2B will be held in September 2022.
- Prior to these workshops, we will share more detailed information about the methodology and the outcomes of the DPE.
- As part of the next set of engagement sessions we will also provide further information about the evolution of the options, and our Initial Options Appraisal.

NEXT STEPS & CLOSE

- Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

- If you have any questions or comments, please don't hesitate to contact us via LGWairspace.FASIS@gatwickairport.com

YOUR LONDON AIRPORT Gatwick

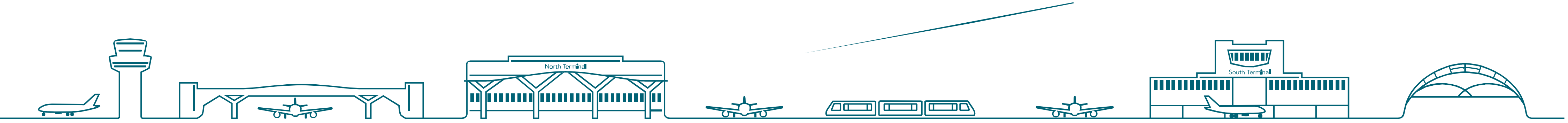
Gatwick Airport FASI South Airspace Change Proposal

Update for stakeholders on the development and assessment of airspace change design options during Stage 2 of the CAP1616 process

Virtual Briefing Session

25th & 30th January and 2nd February

Version v1.0



1. WELCOME & INTRODUCTIONS

Post Workshop Note – IMPORTANT PLEASE READ

As part of the engagement workshop held on the 25th January, some stakeholders asked for a worked example of the development and assessment of Westerly Arrival D and Westerly Arrival E (WAD / WAE).

We agreed that we would provide a worked example of these two options and this would be circulated to all stakeholders following the meeting. **This worked example of WAD/WAE can be found in Appendix A (Slides 56-64).**

Stakeholders also told us that their preference would be for all the arrival options to continue to the Initial Options Appraisal and be subject to further noise analysis before any are discontinued. GAL has considered this feedback and **will include all PBN arrival options (including the four options that we had proposed to discontinue - WAD, WAI, EAK and EAE) in the Initial Options Appraisal.**

GLOSSARY

ACP	Airspace Change Proposal	A request (usually from an airport or air navigation service provider) for a permanent change to the design of UK airspace. An airspace change sponsor must follow a 7-stage process explained in the CAA's document CAP 1616 Airspace Design Guidance.
ANG	Air Navigation Guidance	Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management.
AMS	Airspace Modernisation Strategy	A coordinated strategy and plan for the use of UK airspace for air navigation up to 2040, including for the modernisation of the use of such airspace, prepared and maintained by the CAA.
ATC	Air Traffic Control	Responsible for the safe separation of traffic in controlled airspace
CAA	Civil Aviation Authority	Independent aviation regulator and responsible for the adjudication of airspace change proposals
CAP1616	Civil Aviation Publication 1616	Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information. www.caa.co.uk/cap1616
CCO / CDO	Continuous climb operations / Continuous descent ops	Allow arriving or departing aircraft to descend or climb continuously, to the greatest extent possible.
CLOO	Comprehensive List of Options	A list of viable options an airspace change sponsor develops as part of Stage 2 of the CAP1616 process. The list aims to address the statement of need and align with the Design Principles developed at Stage 1.
DfT	Department for Transport	Department for Transport. Co-sponsors with the CAA of the Airspace Modernisation Strategy
DP	Design Principle	Developed as part of Stage 1 of the airspace change process
DPE	Design Principle Evaluation	Undertaken as part of Step 2A of the CAP1616 process, the Design Principle Evaluation is a qualitative high level assessment which evaluates whether each option on the Comprehensive List of Options has either 'met', 'partially met' or 'not met' each Design Principle.
FASI-S	Future Airspace Strategy Implementation – South	The coordinated programme of airspace modernisation in southern England.
IOA	Initial Options Appraisal	Undertaken as part of Step 2B of the CAP1616 process, the Initial Options Appraisal involves a largely qualitative and some quantitative assessment of the impacts, both positive and negative, of the shortlisted options compared to the 'do nothing' pre-implementation baseline.
NATS	Formerly known as 'National Air Traffic Services	Provide air traffic services across the UK. NATS NERL (NATS (En Route) plc) are responsible for the upper airspace change (airspace network above 7000ft)
	Notional Flight Path	A path based on the basic principles of Instrument Flight Procedure (IFP) design that is used to flood sections of airspace. Notional flight paths are not airspace change options, but assessment of the paths provides a core set of environmental information that can be used when developing routes and options.
	Option	At this stage, an option is one complete system of either arrival or departure routes from the same runway end.

GLOSSARY

NATS / NERL	Formerly known as 'National Air Traffic Services	Provide air traffic services across the UK. NATS NERL (NATS (En Route) plc) are responsible for the upper airspace change (airspace network above 7000ft)
	Notional Flight Path	A path based on the basic principles of Instrument Flight Procedure (IFP) design that is used to flood sections of airspace. Notional flight paths are not airspace change options, but assessment of the paths provides a core set of environmental information that can be used when developing routes and options.
	Option	At this stage, an option is one complete system of either arrival or departure routes from the same runway end.
PBN	Performance Based Navigation	A concept that moves aviation away from the traditional use of aircraft navigating by ground-based beacons to a system more reliant on airborne technologies, utilising satellite systems and improving navigation accuracy and performance.
RMA	Radar Manoeuvring Area	An area of airspace used by ATC to vector aircraft. This allows ATC to sequence and safely separate arriving and departing aircraft.
	System	At this stage, a workable group of arrival or departure routes from the same runway end
	Vectoring	Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an Air Traffic Services surveillance system.

1. WELCOME & INTRODUCTIONS

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

Presenters for today's briefing

- Goran Jovanovic – Airspace Change Manager, Gatwick Airport Limited
- Chris Barnes – Director, Trax International Limited
- Nichola Shaw – Consultant, Trax International Limited

The slides will be circulated following the meeting

1. WELCOME & INTRODUCTIONS

- The slides will be circulated following the meeting along with a record of all questions and answers.
- We will pause regularly during the presentation to take feedback and questions.
- Please raise your virtual hand using the functionality in MS Teams if you would like to make a contribution, rather than putting questions in the chat.

Thank you.

AGENDA

#	Agenda item	Time
1	Welcome and introductions	10 mins
2	Recap on the overall scope and timelines for the ACP	10 mins
3	Update on integration of Gatwick's ACP with interdependent proposals	15 mins
4	Summary of the options development conducted to date	25 mins
5	Overview of the Design Principle Evaluation approach and outputs	25 mins
6	Overview of the Initial Options Appraisal	15 mins
7	Update on the Stakeholder Engagement Report	10 mins
8	Discussion, feedback, next steps and close	40 mins

2. OVERALL ACP TIMELINE UPDATE

The GAL FASI ACP is progressing through Stage 2 of the CAP1616 process, developing and assessing options for the airspace change.

The methodology addresses the requirements laid out in Stage 2 of CAP1616

Step 2A: Develop a Comprehensive List of Options and evaluate them against the Design Principles to narrow down to a **shortlist**.

Step 2B: Conduct an Initial Appraisal of the options on the **shortlist.**

The Initial Options Appraisal is the 1st of 3 phases of appraisal required to refine the options and progressively introduce more detail to the analysis of costs and benefits:

Stage 2: Develop and Assess

Initial Options Appraisal
Largely qualitative assessment of the shortlisted options to highlight the relative impacts, both positive and negative

Stage 3: Consult

Full Options Appraisal
A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms where possible

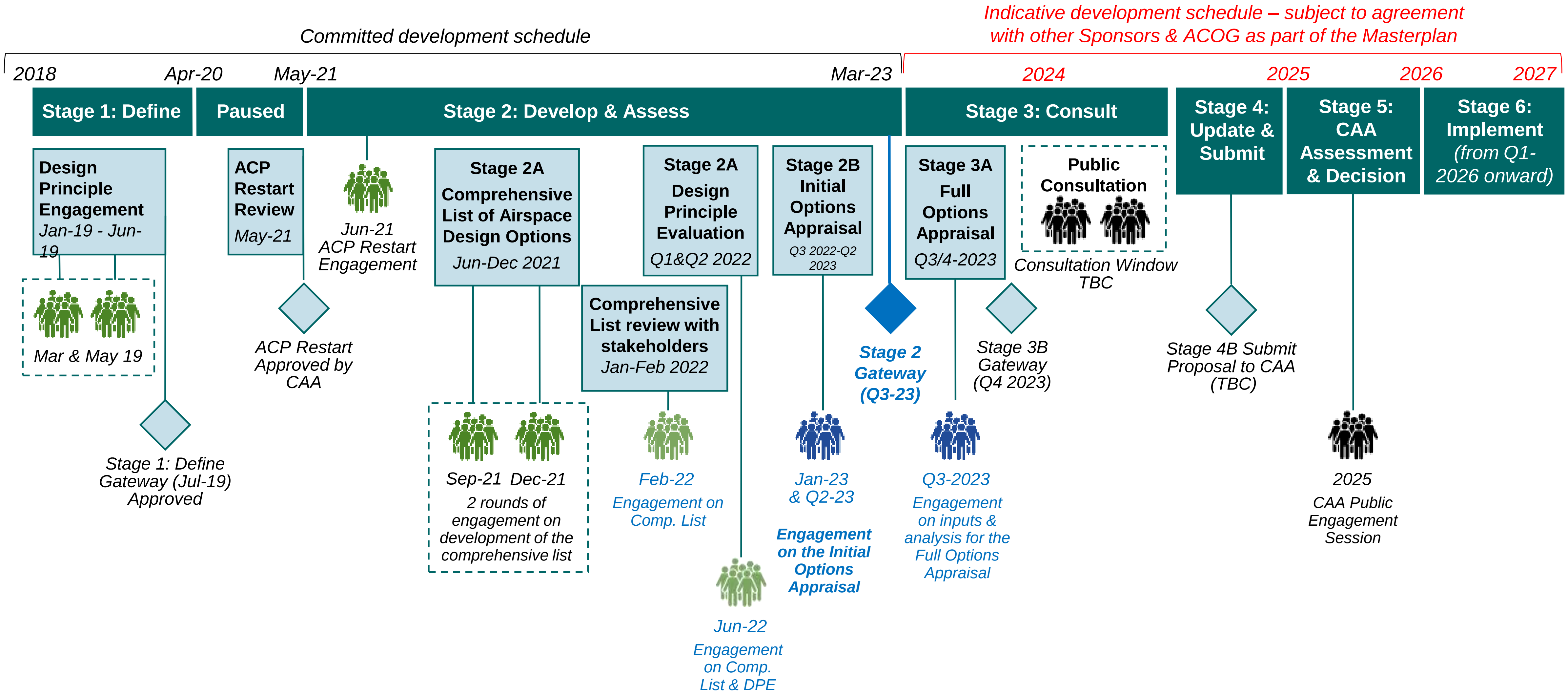
Stage 4: Update and Submit

Final Options Appraisal
The full appraisal updated and refined based on the output of the Stage 3 formal consultation with stakeholders

YOUR LONDON AIRPORT Gatwick

2. OVERALL ACP TIMELINE UPDATE

The following diagram shows the updated Stage 2A timeline within the overall ACP timeline:



2. OVERALL ACP TIMELINE UPDATE

We have extended our timeline to facilitate greater engagement with NATS, Airports and other stakeholders:

Sep to Dec 2021

1 → 1a. Define Sections of Airspace → 1b. Flood with Notional Flight Paths → 1c. Preliminary Assessment of the Notional Flight Paths → 1

Jan to May 2022

2. Build a Comprehensive List of Options → 2 → 3. Refine options using feedback and define the Do Nothing Scenario

Jun 2022

4. Conduct the Design Principle Evaluation to create a shortlist → 3

Jan/Feb 2023

5. Initial Appraisal of the shortlisted options → 3

6. Update the methodology for the Full Options Appraisal

Rounds of engagement during stage 2

1
- Engagement to gather feedback on the methodology that we intend to follow to develop and assess airspace change design options during Stage 2.
- Stakeholder update on the progress towards building a Comprehensive List of Options, integration with the Masterplan and technology / operational concepts.

2
- Engagement to gather feedback on the development of a first Comprehensive List of Options for the ACP.

3
- Engagement on how the outputs of the engagement have shaped the options on the comprehensive list. Our approach to the Design Principle Evaluation.
- Engagement on the Initial Options Appraisal

UPDATE ON INTEGRATION OF GATWICK'S ACP WITH INTERDEPENDENT PROPOSALS

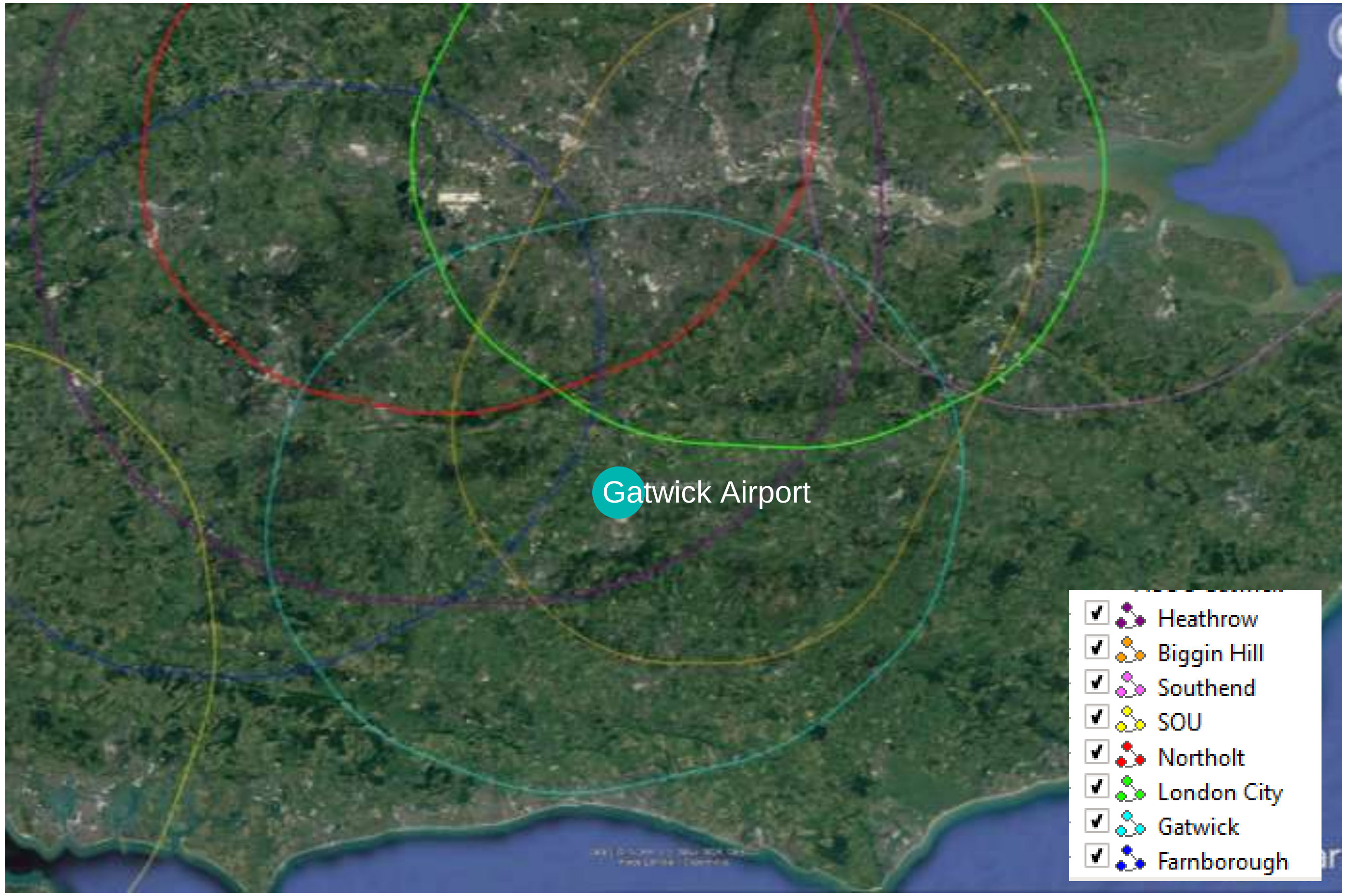
ACOG

Airspace Change Organising Group

CAF

Cumulative Analysis Framework

Airspace Change Masterplan



ACOG Masterplan Iteration 2: Potential Interdependencies associated specifically with the Gatwick ACP

Note: Farnborough Airport joined FASI-S post publication of Iteration 2.

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

Questions & Answers

RECAP: COMPREHENSIVE LIST OF OPTIONS METHODOLOGY OVERVIEW

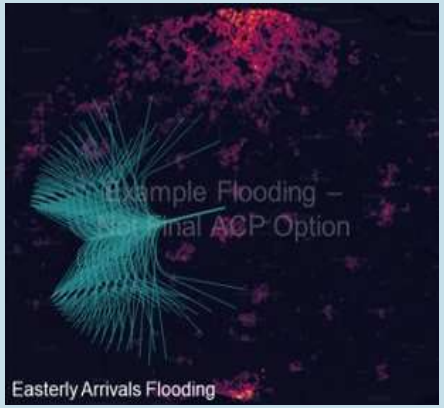
1	Develop an Airspace Design Database
2	Define Do Nothing Option
3	Build Comprehensive List of Options
4	Conduct the Design Principle Evaluation
5	Produce the Initial Options Appraisal
6	Set out Full Options Appraisal Method.

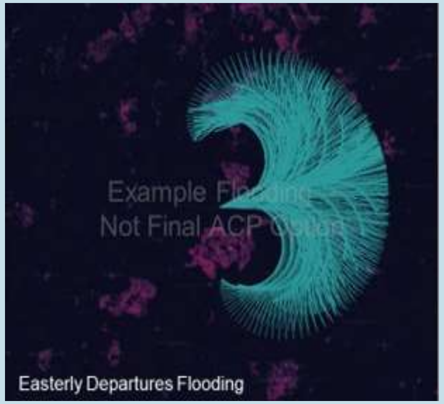
The methodology for developing and assessing the Comprehensive List of Options (CLOO) is organised into six parts aligned to the CAP1616 requirements for developing & assessing options

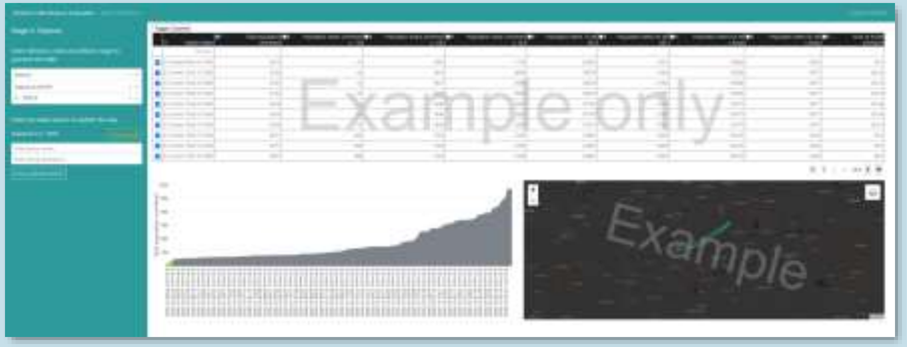
The following slides recap the work undertaken to date to develop the CLOO.

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

1	**Develop an Airspace Design Database**	The Airspace Design Database collates a core set of information needed to clearly demonstrate how each option has been identified and why the first list is considered sufficiently comprehensive.
	Sections of Airspace	The database covered all geographical sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.
	Notional Flight Paths	We defined a broad range of notional flight paths that are technically possible within each section of airspace (an approach known as 'flooding').
	Preliminary Assessment	A core set of information was produced through a preliminary assessment of the performance of each individual notional flight path using a variety of noise and overflight measurements.







SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

Stakeholder Engagement

We engaged with Stakeholders in September 2021 and December 2021 on the methodology we intended to follow when developing Airspace Change Options and we provided details of the Airspace Design Database.

2 Define the 'do nothing'

We defined the 'do nothing' pre-implementation scenario. Full details of this will be included in the Stage 2A submission document which will be published on the CAA's Airspace Change Portal.

3 Build Comprehensive List of Options

The airspace design database gave us lots of data and information which allowed us to identify the comparatively higher performing notional paths however in order to develop airspace change options that meet our Design Principles, we needed to combine these paths in systems. A system was defined as 'a workable group of arrival or departure routes from the same runway end'.

When developing the system options, we looked to the Design Principles and combined the aims of these with the outputs of the Airspace Design Database in order to develop our Comprehensive List of Options.

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Minimise total population overflown	✓ Options developed aim to also meet DP1 DP5 and DP8 DP9	✓ Options developed aim to also meet DP1 DP3 DP5 and DP8	✓ Options developed aim to also meet DP1 DP3 DP5 DP8 and DP9
Minimise population newly overflown	✓ Options developed aim to also meet DP1 DP5 and DP8 DP9	✓ Options developed aim to also meet DP1 DP3 DP5 and DP8	✓ Options developed aim to also meet DP1 DP3 DP5 DP8 and DP9

(DP2 is inherent in all options and DP4 is inherent to all arrivals options)

Based on representative stakeholder feedback, we developed options on our Comprehensive list that focused on minimising total population overflown (i.e. taking a blank sheet approach) and options that focused on minimising population newly overflown (i.e. taking into account existing overflight swathes)

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

3

Build Comprehensive List of Options

Stakeholder Engagement

As part of the process of developing the Initial Comprehensive List of Options, we developed 39 options based on the Design Principles and the outputs of the Airspace Design Database.

In February and March 2022 we held engagement workshops on the Comprehensive List of Options. As per the CAP1616 process, the same stakeholder representatives who were involved in Stage 1B, and in the previous rounds of Stage 2 engagement were invited to attend the workshops.

The purpose of the engagement was to test the Comprehensive List of Options to ensure it has been developed in line with the Design Principles. It's important to note that this engagement was not to seek feedback on the position of each individual flight path included in the options; that will happen later in the CAP1616 process.

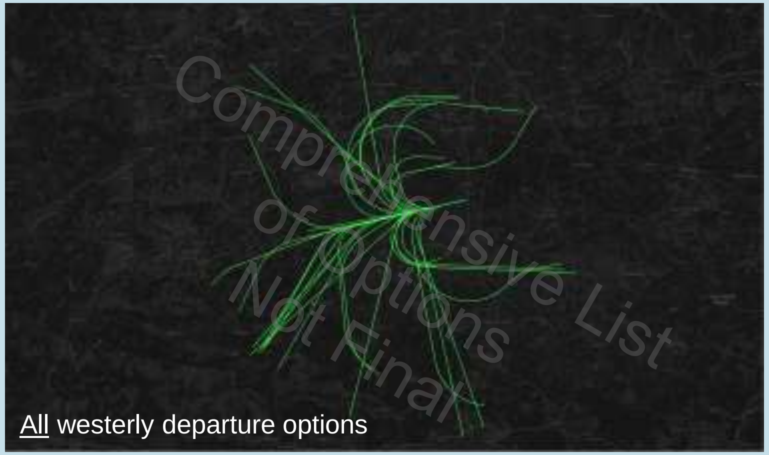
Following the engagement, all feedback was reviewed and where appropriate used to develop further options. The key themes arising from stakeholders' feedback that resulted in further options being developed were:

- Rural areas and Ambient Noise
- Westerly arrivals between 7nm and 10nm
- Arrival respite configurations with two routes
- Balance of total population overflown and newly overflown metrics

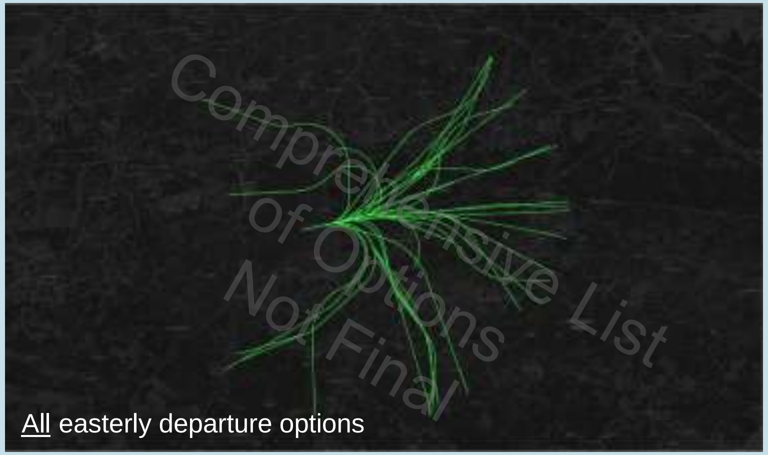
SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

3 **Build Comprehensive List of Options**

Following Stakeholder Engagement, the Comprehensive List comprised of 70 options.
(17 westerly departure options, 18 easterly departure options, 18 westerly arrival options and 17 easterly arrival options).

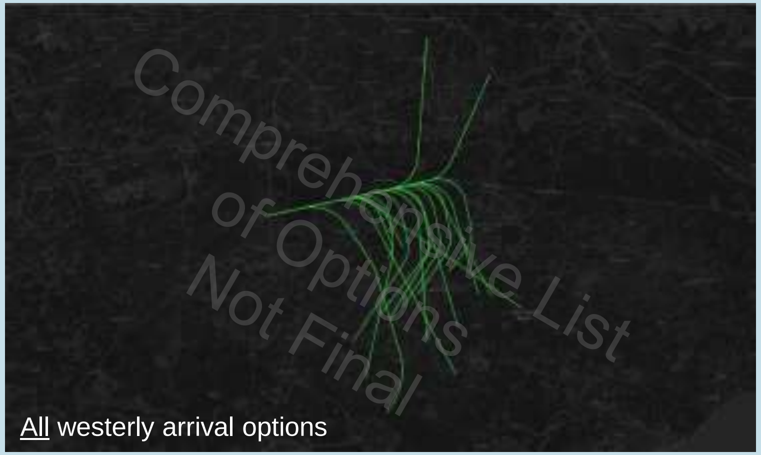


All westerly departure options



All easterly departure options

All easterly arrival options



All westerly arrival options

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

3	**Build Comprehensive List of Options** / **Stakeholder Engagement**	As part of the Stakeholder Engagement we explained that our options have been developed in isolation to any other airport or airspace considerations and options will evolve as we progress through the process and more information becomes available about the potential impacts and the interdependencies with other proposals. The first opportunity to incorporate any information available is as part of the Design Principle Evaluation.
4	**Conduct the Design Principle Evaluation**	The Design Principle Evaluation (DPE) examines how well each option aligns with the Design Principles and shortlists the options to progress to the Initial Options Appraisal. The DPE includes a high level assessment of each option which outlines whether the design principle is **'not met', 'partially met' or 'met'**. The DPE is a relatively high-level, mainly qualitative exercise, but must clearly set out how each option has performed against each Design Principle and why options have continued or been paused.
5	**Produce the Initial Options Appraisal**	The Initial Options Appraisal (IOA) involves a largely qualitative and some quantitative assessment of the impacts, both positive and negative, of the shortlisted options compared to the 'do nothing' pre-implementation baseline. Later on in this presentation we will provide more information about the IOA.
6	**Set out Full Options Appraisal Method.**	Finally, the last step in the methodology is to describe the methodology for producing a quantitative appraisal with monetised costs and benefits. This will form part of our engagement in Stage 3 of the Airspace Change Process.

Where we are now (steps 4 and 5)

YOUR LONDON AIRPORT Gatwick

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

Questions & Answers

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 **Conduct the Design Principle Evaluation**

Design Principle Evaluation Methodology

The Design Principle Evaluation (DPE) examines how well each option aligns with the Design Principles and shortlist the options to progress to the Initial Options Appraisal.

The DPE includes a high level assessment of each option which outlines whether the design principle is **‘not met’, ‘partially met’ or ‘met’**.

The DPE is a relatively high-level, qualitative exercise, but must clearly set out how each option has performed against each Design Principle and why options have continued or been paused.

The following slides provide a high level overview of the methodology of the DPE; full details will be published as part of the Stage 2A submission.

Example of detail in the departure DPE; full details will be published as part of the Stage 2A submission

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 Conduct the Design Principle Evaluation

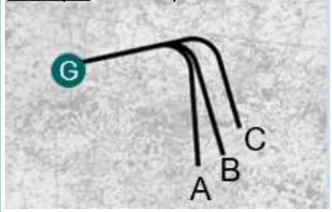
Design Principle Evaluation Methodology

Some Design Principles have been broken down into multiple assessment categories. For example DP6 includes an assessment of track mileage as well as continuous climb / continuous descent performance (CCO/CDO)

	#	1		AMS				2	3	4	5	6		7		8			9	
	DP	Safety by Design (Assessment based on location of options to the proximity of other airports and Gatwick's other routes)						Enhanced Navigation Standards	Limit Adverse Noise Effects	Time Based Arrival Operations	Resilience built in	Optimise Use of Aircraft Capabilities		Long Term predictability and Adaptability		Deconfliction by Design			Locally Tailored Designs	
Option name	Category / Option component			Capacity	Noise	Controlled Airspace	National security	-	-	Only applicable to arrivals	-	Track Distance	CCO/ CDO	Long term predictability	Respite	Overflight within option	Overflight of arrival and departure options	Overflight of neighbouring airports	-	Taken to IOA?
Option Example	Route A																			Yes
	Route B																			Yes
	Route C																			Yes

Illustrative example of DPE

Example arrival option



Some assessments are broken down to look at the options on a route by route basis. This provides a more detailed overview of individual route performance within an option for areas such as track mileage.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

Design Principle Evaluation Methodology

Example methodology criteria:

Design Principle Description	Methodology	Component	Met	Partially Met	Not Met
Optimise Use of Aircraft Capabilities Should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance.	Qualitative assessment of whether an option is optimised to suit aircraft capabilities. This is broken down into two components. **Operational efficiency and environmental performance - track distance;** Track distance compared against the baseline. At this early stage in assessment, track distance is a proxy indicator for potential fuel burn and CO_2 impacts and benefits.	Track length	The route has the potential to reduce track distance and associated CO_2 emissions	The route has the potential to maintain track distance and associated CO_2 emissions	The route has the potential to increase track distance and associated CO_2 emissions
	Continuous climb operations (CCO) and continuous descent operations (CDO); following information from NATS around the airspace above 7000ft, and informed by the ACOG Interdependency Map showing neighbouring airports, we will qualitatively evaluate whether an option is expected to achieve CCO / CDO to/from FL90.	CCO/CDO	The route option has the potential to achieve CCO/CDO to/from FL90 subject to neighbouring airports and NERL designs.	The route option has the potential to improve CCO/CDO compared to the baseline however CCO/CDO to/from FL90 may not be available.	The route option is not expected to achieve CCO/CDO and would degrade CCO/CDO compared to the baseline.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 Conduct the Design Principle Evaluation

Design Principle Evaluation Methodology:

DP1 Safety by Design

Must at least maintain, and ideally enhance, aviation safety, by reducing or removing safety risk factors, provided enhancement does not have a detrimental impact on other benefits. (Core Principle)

- An initial, high level qualitative safety assessment was undertaken.
- This incorporated some initial information about the airspace above 7000ft to assess whether the design options could be safely integrated into the wider network.
- The main feedback from NERL was that the broad departure flows within the network airspace will remain largely similar to today.
- This information helps us to understand the broad flows of traffic likely to occur from our neighbouring airports, even if those airports are yet to publish their comprehensive list of options or do not have a detailed comprehensive list.

Broad departure flows within the network airspace

- This not only informs the safety assessment but helps with other assessments about potential interdependencies with other airports and the likelihood of a route achieving continuous climb or descent.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

Design Principle Evaluation Methodology:

Airspace Modernisation Strategy (AMS)	The CAA states; "Subject to the overriding design principle of maintaining a high standard of safety, the highest priority principle of this airspace change that cannot be discounted is that it accords with the CAA's published Airspace Modernisation Strategy (CAP 1711) and any current or future plans associated with it." Therefore as part of the DPE, as well as assessing each option against each design principle, an additional assessment has been undertaken against the parameters outlined in the Airspace Modernisation Strategy (AMS): • **Capacity:** Qualitative assessment of whether the option is expected to meet or not meet capacity requirements. • **Noise:** Assessed as part of DP3, DP7, DP8 and DP9 • **Controlled Airspace (CAS):** Qualitative SME assessment of whether the option is expected to require any more, less or the same volume of CAS than today. This assessment is linked closely to whether the option enables CCO/CDO (DP4) or not and whether it is contained within the existing CAS volumes. • **National Security:** Qualitative assessment of an options potential to impact national security requirements – this will include any feedback received as part of our engagement on the comprehensive list of options.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 **Conduct the Design Principle Evaluation**

Design Principle Evaluation Methodology:

DP2 Enhanced Navigation Standards	*Should adopt the most beneficial enhanced navigation standards for new routes. (Core Principle)*	Qualitative SME evaluation of whether an option is expected to adopt enhanced navigation standards.
DP3 Limit Adverse Noise Effects	*Shall aim to limit and where possible reduce the adverse impacts of aircraft noise. (Core Principle)*	Qualitive assessment of whether an option has been designed to limit and where possible reduce the adverse impact of aircraft noise. This considers the methodology and indicative noise data used when developing the option, alongside information about improved climb performance. Owing to the methodology used to develop the options, we have not discounted any options on the basis of noise metrics from the DPE. The DPE is a qualitative evaluation that forms the first in several stages of analysis of the options. As part of the Initial Options Appraisal, in the next step of the ACP, we will undertake detailed noise assessments of the options that progress.
DP4 Time-based Arrival Operations	*Should be compatible with the adoption of time-based arrival operations.*	Qualitative SME analysis of each arrival options compatibility with time-based arrival operations. Note: The implementation of time-based arrivals is dependent on the technology available from aircraft and the airspace network above 7000ft.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 **Conduct the Design Principle Evaluation**

Design Principle Evaluation Methodology:

DP5 Resilience Built In	*Should be materially unaffected by most disruptions, including poor weather and technical failures, through the provision of adequate contingencies.*	Qualitative SME assessment of the resilience of each option.
DP6: Optimise Use of Aircraft Capabilities	*Should enable aircraft operators to optimise the use of their fleet capabilities to improve operational efficiency and environmental performance.*	Qualitative assessment of whether an option is optimised to suit aircraft capabilities. This is broken down into two components: • **Track distance;** At this early stage in assessment, track distance is a proxy indicator for potential fuel burn and CO_2 impacts and benefits. • **Continuous climb operations (CCO) and continuous descent operations (CDO);** following information from NATS around the airspace above 7000ft, and informed by the ACOG Interdependency Map showing neighbouring airports, we will qualitatively evaluate whether an option is expected to achieve CCO / CDO to/from FL90.
DP7 Long Term Predictability & Adaptability	*Should offer long term predictability of flight paths and respite and offer adaptation for the future airport development scenarios outlined in our draft Masterplan.*	Qualitative SME assessment of each option. This is broken down into two components: • **Long term predictability:** the evaluation will review whether the option offers the potential for long term predictability. • **Respite:** whether the option offers the potential for predictable respite within the option itself. If the option offers noise relief through a different mechanism such as dispersion, we have also noted this.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 Conduct the Design Principle Evaluation

Design Principle Evaluation Methodology:

DP8 Deconfliction by Design	*Should seek, where possible, to deconflict routes by design below 7000ft, and the prevalence of overflight of a community by flights on different routes and/or by neighbouring airport traffic.*	Qualitative assessment to understand whether an option is deconflicted by design. This is broken down into three components: **Overflight within the option:** We have assessed whether the option potentially creates cumulative impacts through multiple paths overflying the same area between 0-7000ft. **Overflight of arrivals and departures:** We have evaluated whether there is the potential for conflicts between the arrivals and departures options between 0-7000ft. At this stage, as we have not yet combined our arrivals systems and departure systems into options, we assessed this by looking at each option against all of the corresponding systems. **Overflight of neighbouring airports:** This has been assessed from 0-7000ft only. At this early stage, where available, we assessed against neighbouring airport options and, where not available, we will assess the likelihood of cumulative overflight using the ACOG map as per iteration 2 of the masterplan. Following the publication of Iteration 2 of the Masterplan, Farnborough Airport have joined the FASI-S programme and therefore we have also added Farnborough to the map.
DP9 Locally Tailored Designs	*Should enable decisions which affect how aircraft noise is best distributed to be informed by local circumstances and consideration of different options.*	Qualitative assessment of whether the development of the option has considered different local circumstances and whether it has the potential for further development to tailor for the local environment. As part of the Initial Options Appraisal (IOA) in the next step of the process, we will undertake detailed qualitative and some quantitative noise assessments of the options. The IOA includes assessments of impacts to noise sensitive buildings such as hospitals, schools, and places of worship, as well as assessment of areas of tranquillity and biodiversity.

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

Questions & Answers

YOUR LONDON AIRPORT
Gatwick

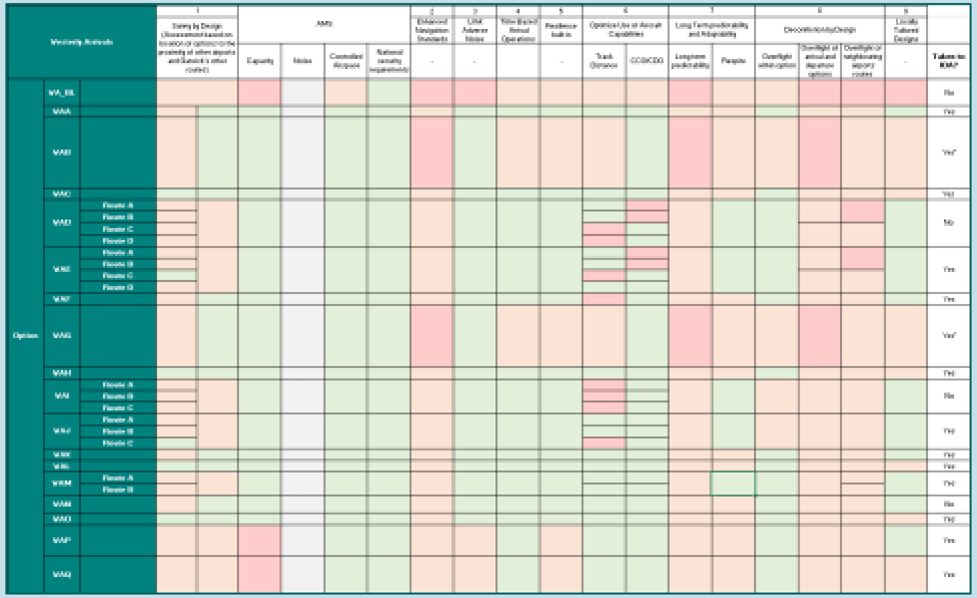
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

DPE Outcomes: Westerly Arrivals

The outcome of the arrivals DPE was a matrix of information about the performance of each option against each Design Principle:



Two options have been discontinued at the DPE: **WAD, WAI**

WAD and **WAI** have been discontinued on the basis of track distance and subsequently CO_2/Fuel burn impacts. In both cases, alternative configurations (WAE and WAJ) were developed using the same noise metrics and these alternative configurations either maintained or improved track distance.
WAN was developed following the stakeholder engagement and is a duplicate of WAA.
Full details of the DPE will be published as part of the Stage 2A submission.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

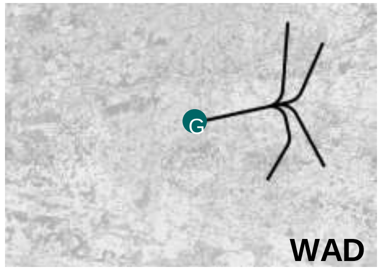
DPE Outcomes: Example

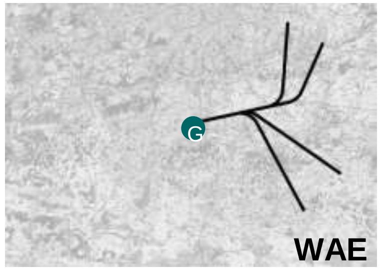
- When developing the options, we used the data from the airspace design database to identify groups of high performing notional paths.
- The Design Principles were then used as a framework to build the options informed by the data in the database.
- As highlighted in previous engagement sessions, sometimes the data suggested that multiple configurations could be developed and in this case, we included both configurations on the CLOO.
- We have used the outcome of the DPE to compare the performance of these options.

Comprehensive List of Options Development

WAD and WAE were both developed with a a focus on meeting DP3 (limit adverse noise effects), DP7 (Long term predictability and adaptability) and minimise total population overflown.

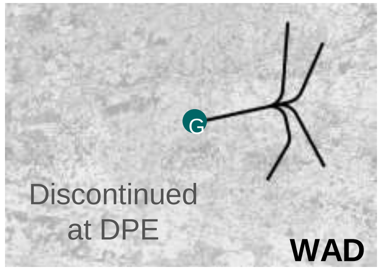
The high performing notional flight path data suggested two configurations and therefore both were added to the CLOO.





Design Principle Evaluation

Within WAD the arrivals from the south will account for the majority of Gatwick arrivals and in this option, there is increased track distance. When we compare this to WAE, the equivalent routes improve track mileage. In addition to this, WAE offers a slightly better safety performance and therefore on this basis WAD is paused at the DPE and will not be taken through to the IOA.



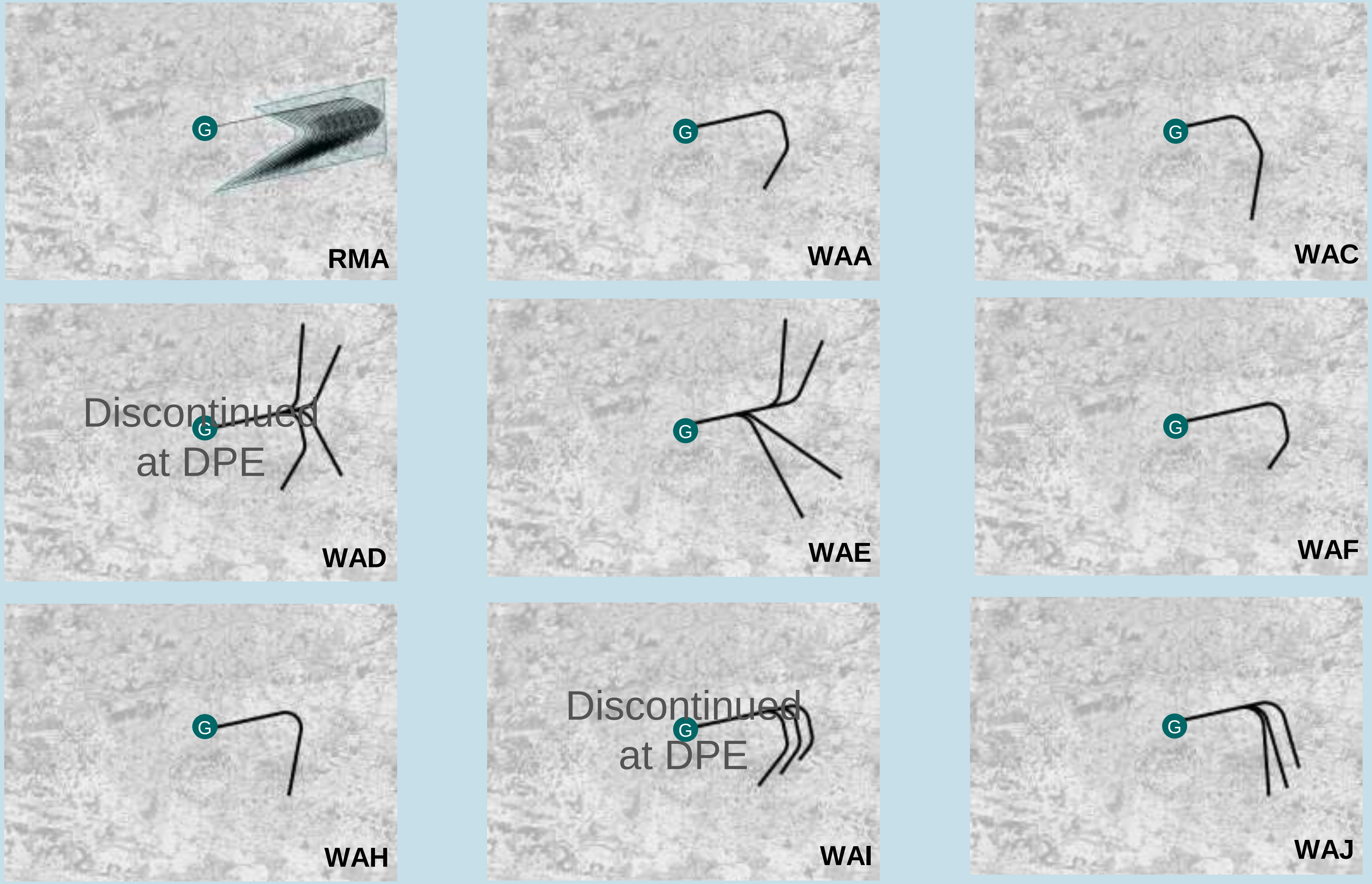
0-7000ft (3^o descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

Westerly Arrival Options



RMA Swathe 0-7000ft

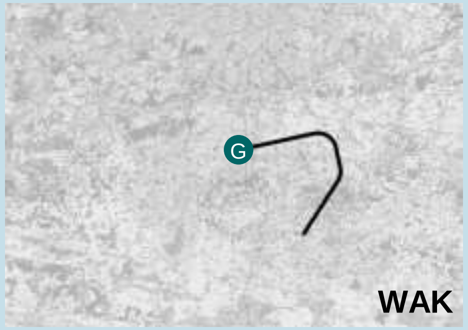
0-7000ft (3º descent)

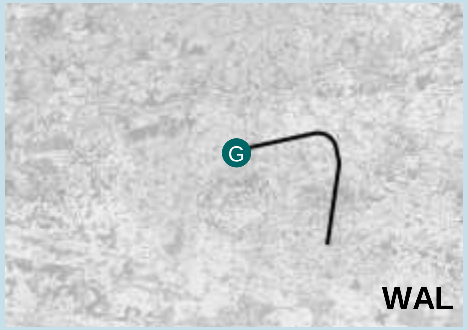
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

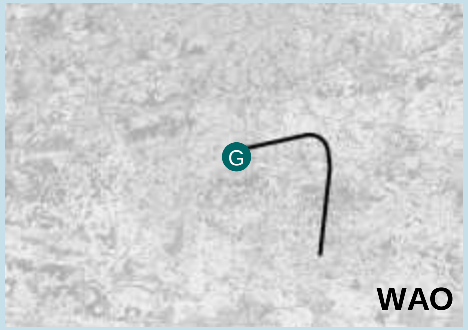
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

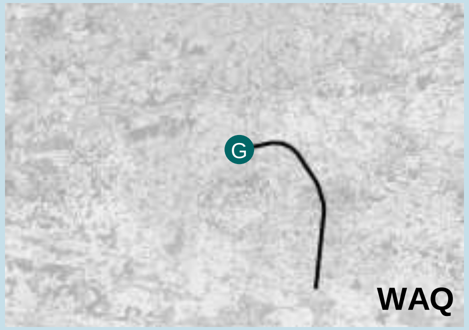
5 **Options for IOA**

Westerly Arrival Options









RMA Swathe 0-7000ft

0-7000ft (3^o descent)

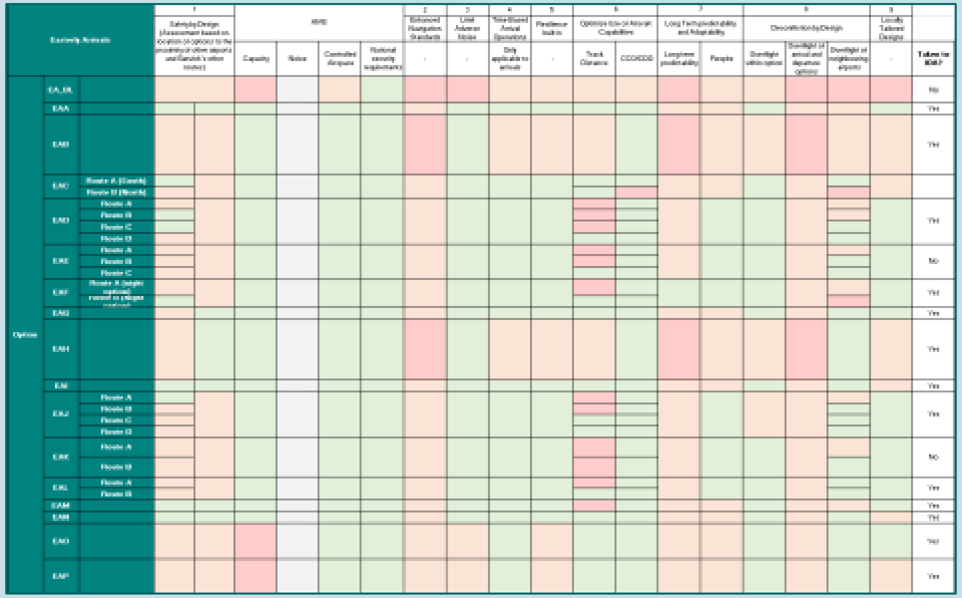
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 **Conduct the Design Principle Evaluation**

DPE Outcomes: Easterly Arrivals

The outcome of the arrivals DPE was a matrix of information about the performance of each option against each Design Principle:



Two options have been discontinued at the DPE: **EAK and EAE**

EAK has been discontinued on the basis of track distance and subsequently CO_2/Fuel burn impacts. An alternative configuration (EAL) was developed using the same noise metrics and offers improvements to track distance.

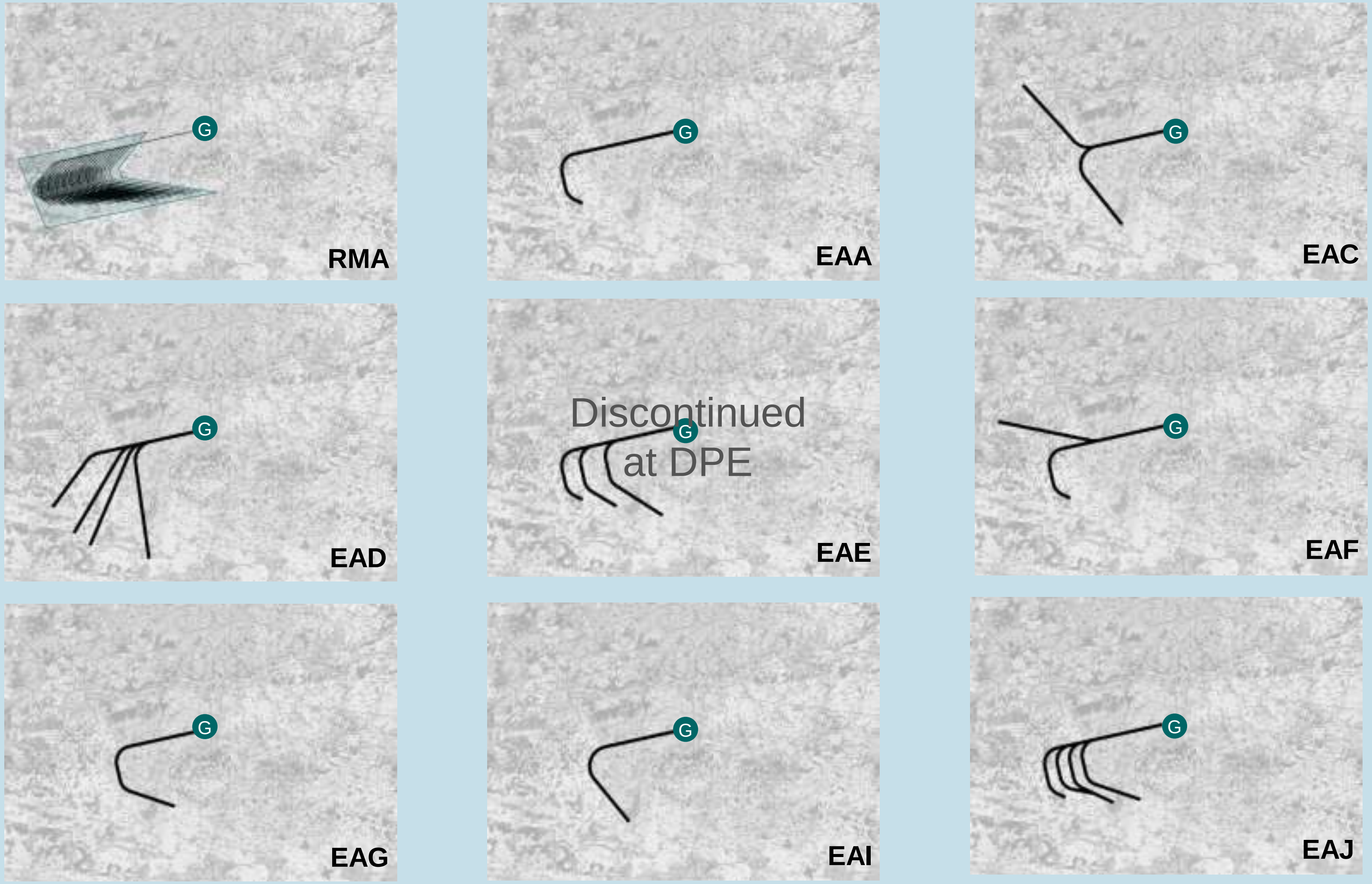
EAE and EAD were developed using the same noise metrics. EAD offers slightly better safety performance. Both options increase track distance however in the case of EAE, option EAL contains two of the routes within EAE and this cumulatively improves track distance. Therefore **EAE** has been discontinued.

Full details of the DPE will be published as part of the Stage 2A submission.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

Easterly Arrival Options



RMA Swathe 0-7000ft

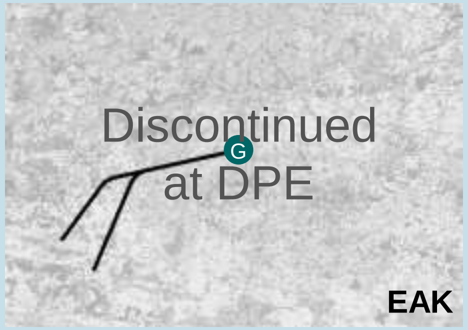
0-7000ft (3^{o} descent)

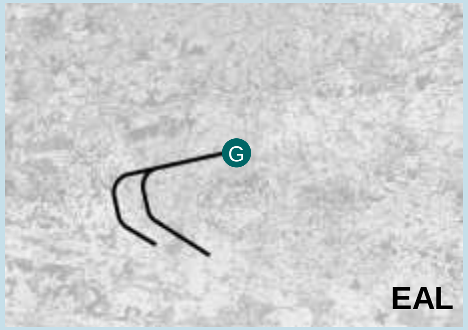
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

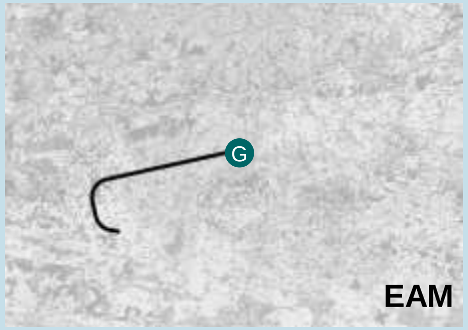
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

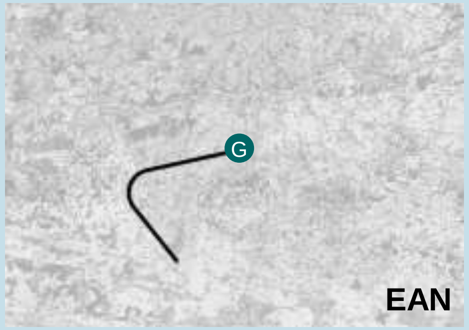
5 Options for IOA

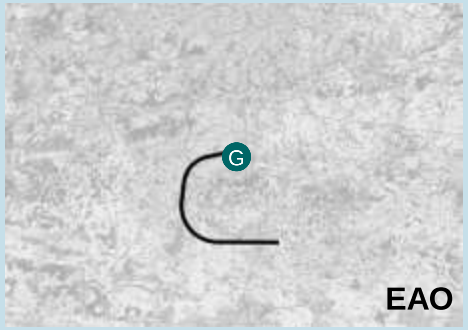
Easterly Arrival Options

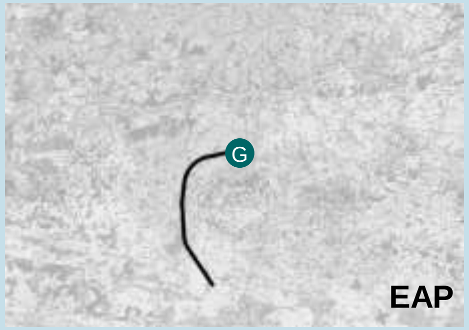












RMA Swathe 0-7000ft
0-7000ft (3^o descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 Conduct the Design Principle Evaluation

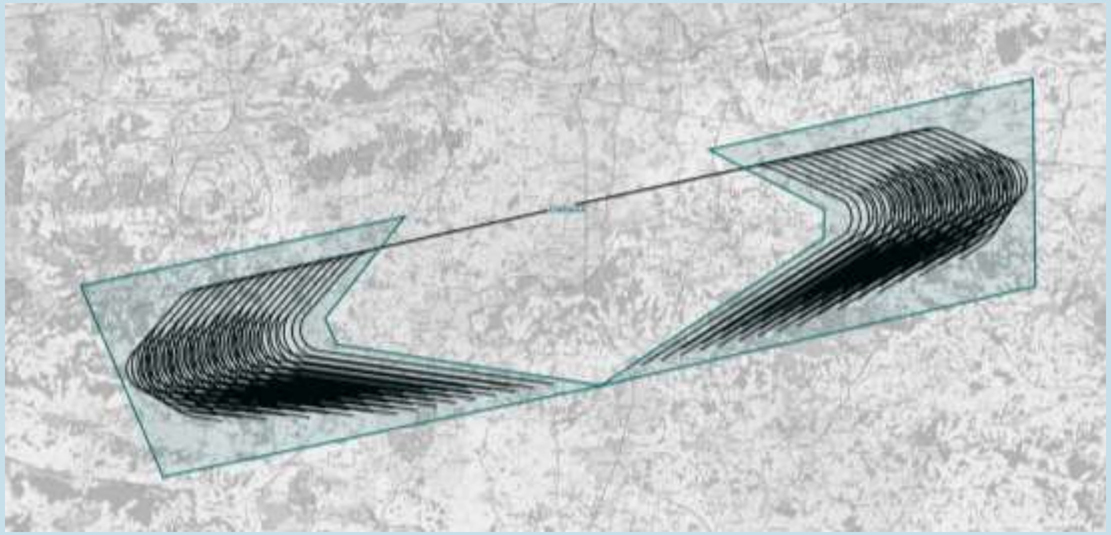
DPE Outcomes: Arrivals RMA

Within the DPE, we assessed four RMA options: **EAB, EAH, WAB, WAG**. The RMA options did not perform as well as some of the other PBN options within the DPE however an RMA will be required to be implemented alongside any potential PBN options as the technology required within the airspace above 7000ft to accommodate only PBN arrivals in high traffic scenarios is unlikely to be available at the point of implementation.

The shape and size of the RMA cannot be defined by data alone. We expected the final arrival solution will be developed and refined to reflect integration with the network above 7000ft, neighboring airport's options and our shortlisted PBN arrival and departure options.

Therefore, an outcome of the DPE is that we have merged the EAB and EAH, and WAB and WAG into two options.

We've then flooded these two options with further notional flight paths for the purposes of analysis. In the IOA, we will undertake assessment of these in 4nm bands. E.g joining at 8-12nm, 9-13nm, 10-14nm, 11-15nm and 12-16nm.



Illustrative example of the RMA options (0-7000ft) and notional flight paths for assessment

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

DPE Outcomes: Baseline 'Do nothing' Options

The DPE showed that the options overall performed better than the easterly and westerly baseline scenarios for arrivals and departures. This was because the baseline scenarios do not meet the Government's AMS, nor do they address the statement of need or enable any environmental, controlled airspace or operational benefits. The baseline 'do nothing' scenarios have therefore been discontinued however they will remain present throughout the ACP for baseline comparative purposes only.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

Questions & Answers

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 **Conduct the Design Principle Evaluation**

DPE Outcomes: Departures

The outcome of the departures DPE was a matrix of information about the performance of each option against each Design Principle.

In the case of departures, the feedback from NATS NERL identified that some routes within some options were not safely viable. Within the DPE matrix, any individual routes that were categorised as 'not viable' were discontinued.

The DPE also identified that most options in their current configurations would not meet capacity as they would not be compatible with the network design and the broad flows of departure traffic above 7000ft.

Therefore for departures, an outcome of the DPE was that we evolved the configuration of the existing options so that they are more closely compatible with the network airspace design above 7000ft. The following slides provide more detail of this.

Broad departure flows within the network airspace

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

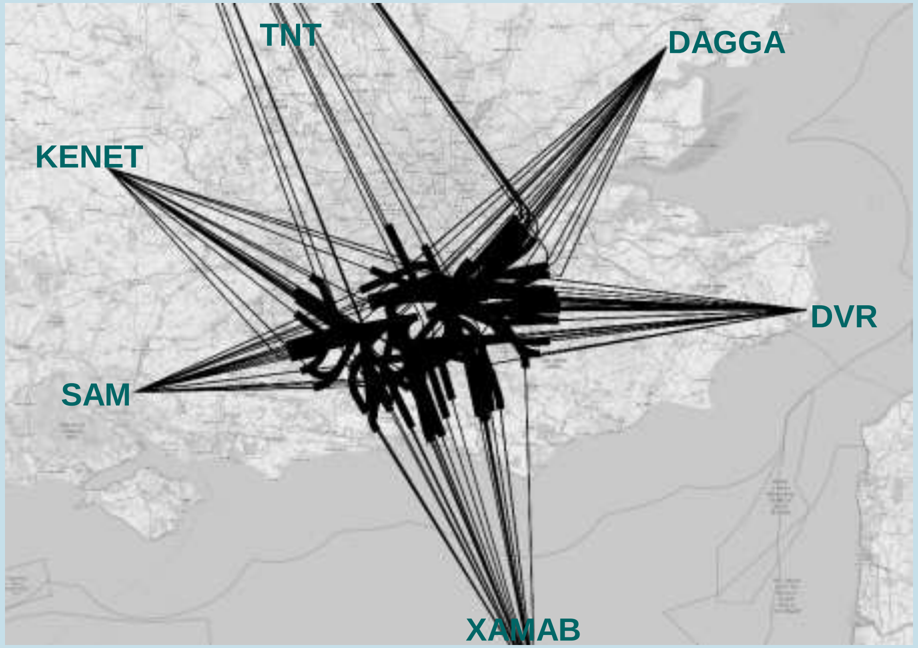
Departures: Option Evolution

In order to evolve our options to integrate with the airspace above 7000ft we have:

- Discontinued any routes which were identified as not safely viable.
- Discontinued the respite options as these wouldn't be suitable for the evolved configurations. This doesn't mean we won't have options with respite in future but we will explore respite in further detail once the configuration of our shortlist of options is known.
- We next connected all the remaining routes to network exit points they could potentially serve. These are based on the broad flows indicated by NERL.

0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Continued routes from the Comprehensive List 0-7000ft (thick black), connection to network exit points 7000ft+ (thin black)

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

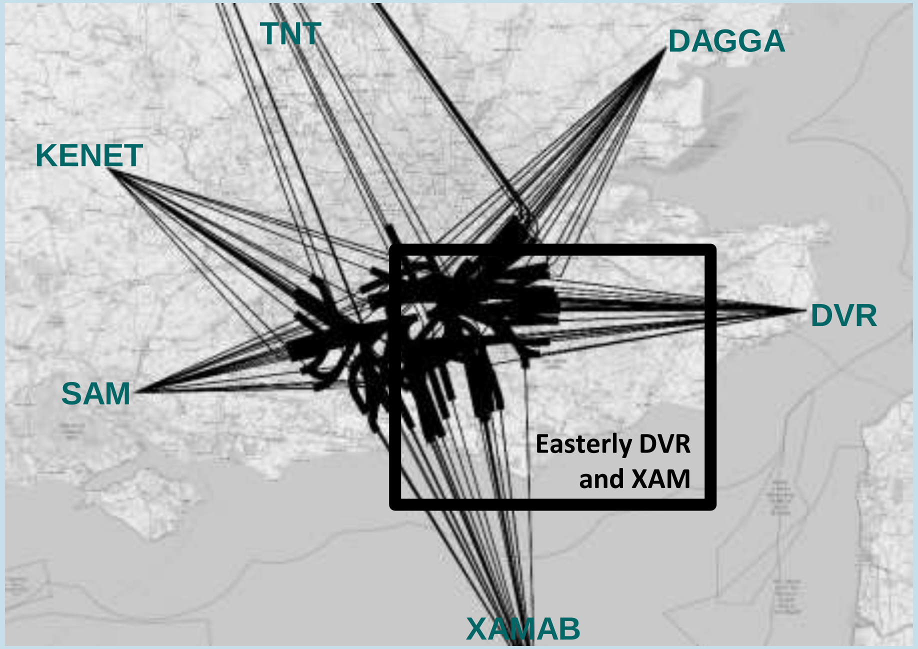
Conduct the Design Principle Evaluation

Departures: Option Evolution

The routes now need to be assembled back together into systems. At this stage, a system is a viable group of departure routes for either easterlies or westerlies.

Owing to the number of routes, these have been grouped together based on similar operational compatibility characteristics in order to undertake an operational feasibility assessment. Each route that has progressed from the DPE has been allocated a group(s) and this will be detailed as part of the Stage 2A submission document.

In this example, we are going to look at the Easterly DVR and southerly XAM routes:



0-7000ft (6% Climb)
7000ft +

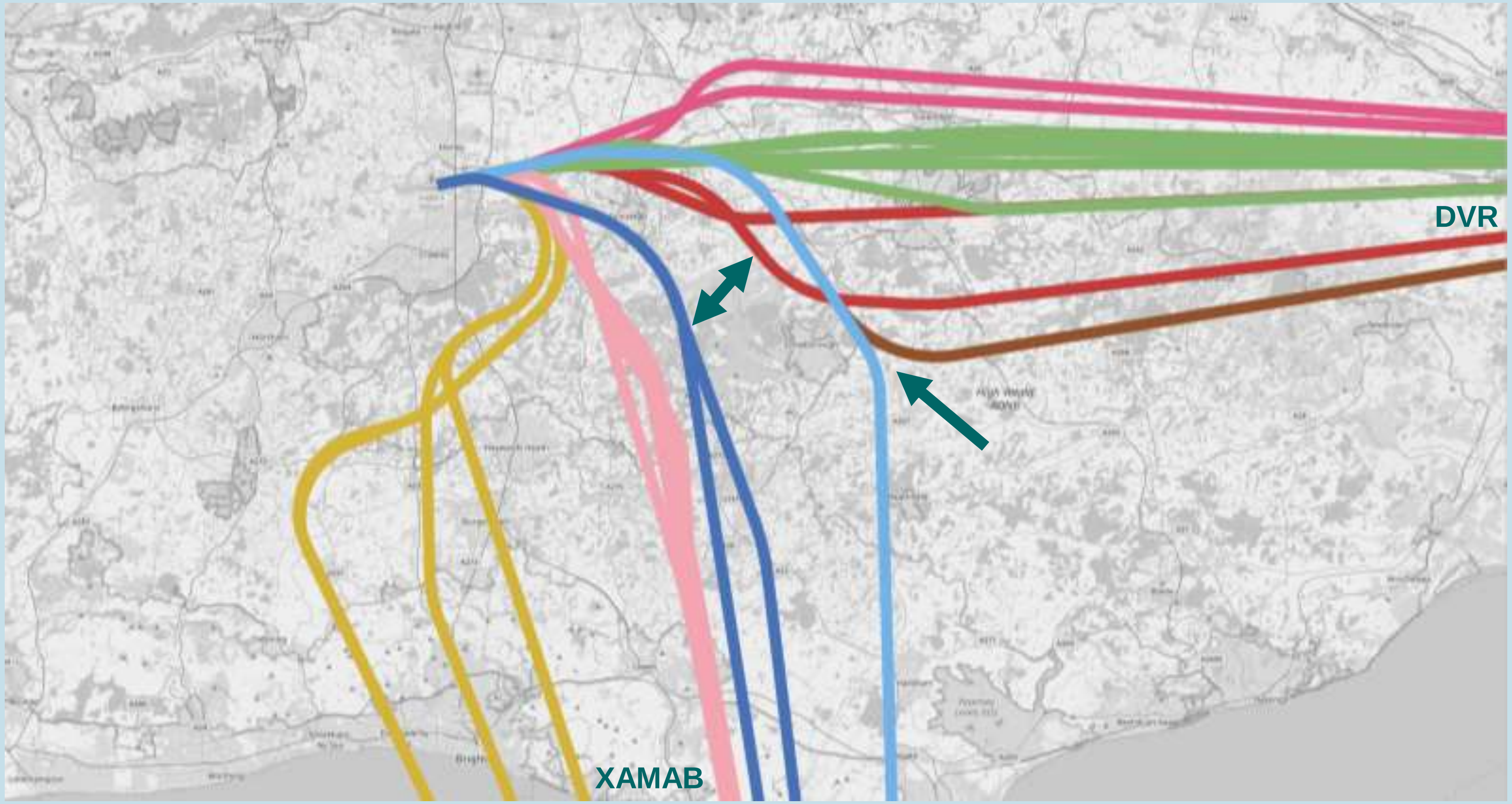
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

Departures: Option Evolution



In this example, the XAMAB and DVR departures have been split into four groups denoted by the different colours. The assessment took information available about the airspace above 7000ft, regulation around the safe separation of routes and other airspace regulation and assessed whether each group of routes would be safely compatible with the other groups serving different exit points.

YOUR LONDON AIRPORT Gatwick

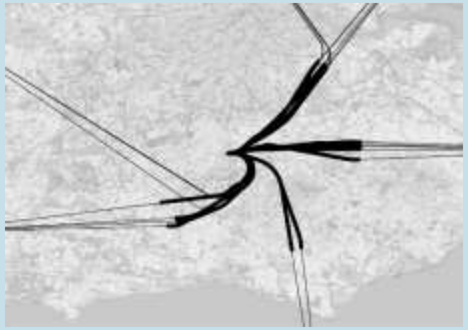
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

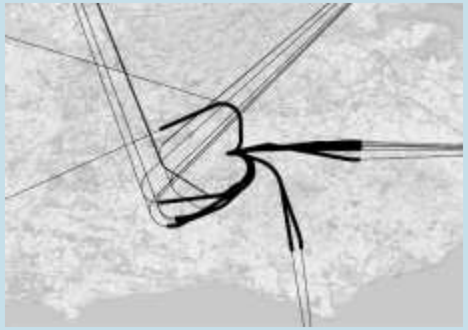
4 Conduct the Design Principle Evaluation

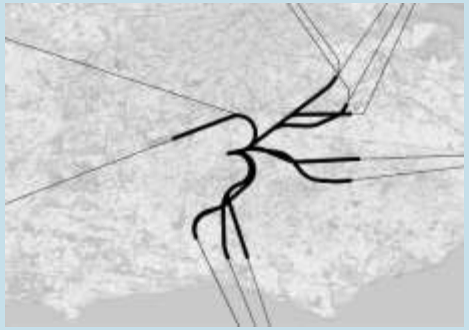
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures: Option Evolution







Using information from the assessment, the remaining viable groups were combined into operationally compatible systems with every viable group included in at least one option.

As we progress through the process, we may look to reconfigure the groups if the environmental and operational assessments suggest that this would be beneficial.

(Images show examples of Easterly Departure option configurations)

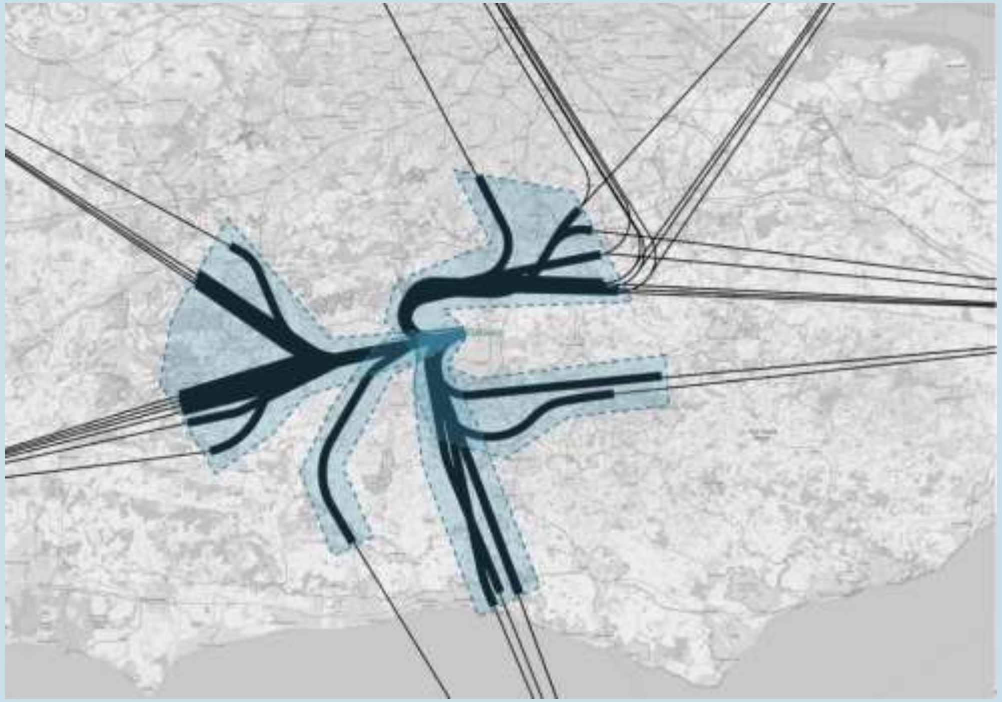
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4

Conduct the Design Principle Evaluation

Departures: Option Evolution

What does this mean for the options in the Initial Options Appraisal (IOA)?



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Going into the IOA the departure options are now built with groups which create swathes. Today's existing centerlines have also been incorporated into the groups.

The routes will be used to generate data that allows analysis of the benefits and impacts compared to the do nothing baseline. As we progress through the process, the groups will be refined until the point where we have a single route centerline that serves each network exit point. This refinement will be based on the Initial Options Appraisal assessments and integration with the network and neighbouring airports.

As part of our Comprehensive List of Options, we also had four options that were based on current nominal centrelines with improved climb gradients – these continued through to the IOA.

Options for respite will be considered once the shortlist of options is known.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

Easterly Departure Options

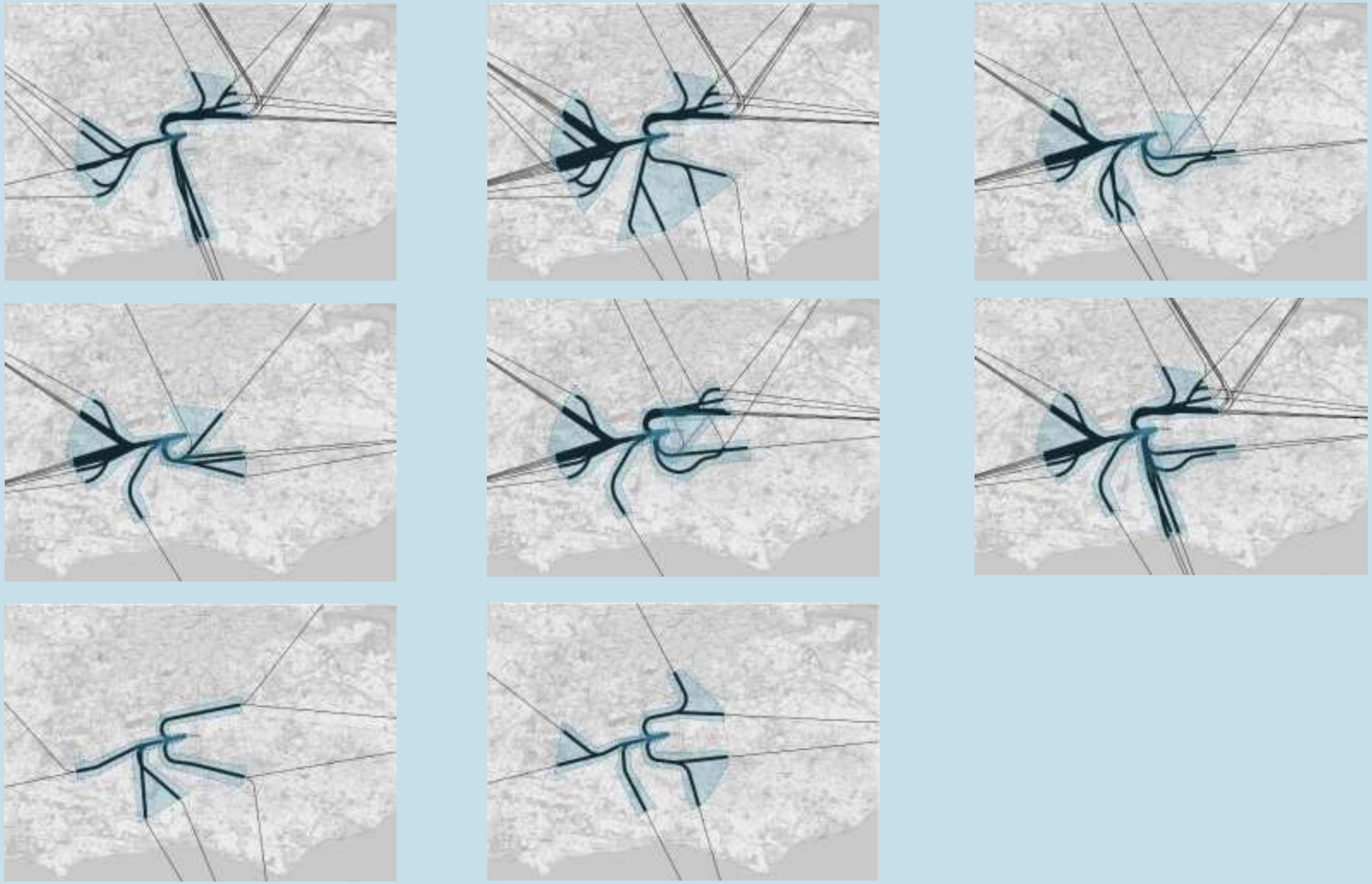
Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

Westerly Departure Options



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5

Options for IOA

Departure Options Summary

In summary for departures:

- All viable routes have been continued to the IOA
- These routes have been grouped and reconfigured into options that are broadly compatible with the network airspace above 7000ft.
- The Stage 2A document will outline this process and contain the audit trail of the progression of each route through the airspace change process.

- Within the Initial Options Appraisal, the routes will be used to generate data that allows analysis of the benefits and impacts compared to the do nothing baseline.
- As we progress through the airspace change process, the groups will be refined until the point where we have a single route centerline that serves each network exit point. This refinement will be based on the Initial Options Appraisal assessments and integration with the network and neighbouring airports.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

Questions & Answers

YOUR LONDON AIRPORT Gatwick

INITIAL OPTIONS APPRASIAL OVERVIEW

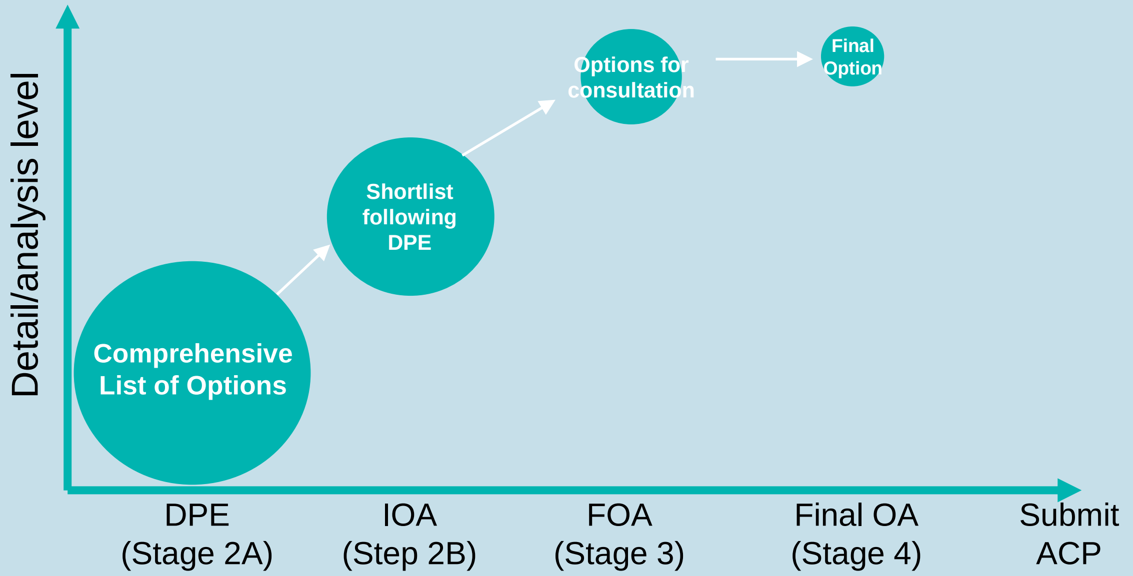
5 **Initial Options Appraisal (IOA)**

The Initial Options Appraisal

The Step 2B **Initial Options Appraisal (IOA)** is the first stage in a three-phase appraisal of airspace change options. It involves the mainly qualitative appraisal of the airspace change options that have proceeded from Step 2A (the DPE).

The Stage 3 **Full Options Appraisal (FOA)** is required to provide more rigorous evidence, typically through quantitative evaluation, of the options that will be taken to the public Stage 3 consultation compared against the ‘do nothing’ pre-implementation scenario.

Finally, the Stage 4 **Final Options Appraisal,** repeats the Full Options Appraisal on the final design which will be submitted for the ACP.



INITIAL OPTIONS APPRASIAL OVERVIEW

5

Initial Options Appraisal (IOA)

The Initial Options Appraisal

The IOA requires sponsors to carry out an initial qualitative assessment of the benefits and impacts of each option, tested against the 'do nothing' pre implementation baseline scenario. The purpose of this initial appraisal is to highlight to change sponsors, stakeholders and the CAA the relative differences between the impacts, both positive and negative, of each option.

As part of the Step 2B IOA document, change sponsors are required to:

- Provide an overview of the options taken to the Initial Options Appraisal
- Provide details of the criteria and methodology for assessing the options
- Describe the baseline 'do nothing' pre-implementation scenario
- Detail the benefits and impacts of each option tested against the baseline
- Draw qualitative conclusions on the outcome of the IOA and shortlist options

We expect the outcome of the IOA to be a shorter list of options that are progressed into Stage 3.

As we progress through the initial parts of Stage 3 which prepares for consultation, we expect the shortlist of options to be refined and evolve as we understand further information about the integration with the wider airspace.

INITIAL OPTIONS APPRASIAL OVERVIEW

5

Initial Options Appraisal (IOA)

The Initial Options Appraisal

Assessment Criteria
The assessment criteria used for the IOA has been categorised based on the requirements of CAP1616 Appendix E.

We have added an additional category called 'Interdependencies, conflicts and trade-offs' to satisfy the requirements to outline potential interdependencies with other FASI-S ACPs, and 'Airspace Modernisation Strategy' to satisfy the 7 confirmed indicators that the CAA will use to assess whether this Stage 2 submission accords with the AMS including iteration 2 of the Masterplan.

The baseline scenarios and all the options that have proceeded to the IOA will be assessed using the same criteria and methodology and we will follow this table structure across the appraisal of all of our options.

Group	Impact
Communities	Noise impact on health and quality of life
Communities	Air Quality
Wider Society	Greenhouse Gas Impact
Wider Society	Capacity/Resilience
General Aviation	Access
General Aviation/ commercial airlines	Economic impact from increased effective capacity
General Aviation/ commercial airlines	Fuel Burn
Commercial airlines	Training costs
Commercial airlines	Other costs
Airport/ANSP	Infrastructure costs
Airport/ANSP	Operational costs
Airport/ANSP	Deployment costs
All	Safety
All	Performance against the vision and parameters/strategic objectives of the AMS
All	Interdependencies, conflicts and trade-offs

SUMMARY OF THE OPTIONS DEVELOPMENT CONDUCTED TO DATE

Questions & Answers

YOUR LONDON AIRPORT Gatwick

STAKEHOLDER ENGAGEMENT REPORT UPDATE

YOUR LONDON AIRPORT Gatwick

Next Steps

- We will be holding inform workshops, concentrating on the outcomes of the Step 2B Initial Options Appraisal in Q2/Q3-2023.

NEXT STEPS & CLOSE

- Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

- If you have any questions or comments, please don't hesitate to contact us via LGWairspace.FASIS@gatwickairport.com

Gatwick Airport FASI South Airspace Change Proposal

Appendix A

Additional Information Following Stakeholder Engagement

WAD and WAE example

February 2023

Appendix A: Worked Example

As part of the stakeholder engagement session held on the 25th January, some stakeholders asked for further details about the proposed methodology outlined in the arrivals section of the presentation.

Stakeholders suggested that a worked example of Westerly Arrival D and Westerly Arrival E (WAD / WAE) would help clarify the process of developing, assessing and discontinuing options.

We agreed that we would provide a worked example of these two options and this would be circulated to all stakeholders following the meeting.

The following slides provide details of this worked example.

Appendix A: Worked Example

- When we developed options WAD / WAE for the comprehensive list, there was a focus on meeting DP3 (Limit Adverse Noise Effects) and DP7 (Long-term predictability and adaptability (respite routes)). For these options, we were also focusing on minimising total population overflown:

Options Development Matrix	Limit Adverse Noise Effects (DP3)	Optimise Use of Aircraft Capabilities (DP6)	Long Term Predictability & Adaptability (DP7)
Minimise total population overflown	✓ Options developed aim to also meet DP1 DP5 and DP8 DP9	✓ Options developed aim to also meet DP1 DP3 DP5 and DP8	✓ Options developed aim to also meet DP1 **DP3** DP5 DP8 and DP9
Minimise population newly overflown	✓ Options developed aim to also meet DP1 DP5 and DP8 DP9	✓ Options developed aim to also meet DP1 DP3 DP5 and DP8	✓ Options developed aim to also meet DP1 DP3 DP5 DP8 and DP9

(DP2 is inherent in all options and DP4 is inherent to all arrivals options)

Image source: Stakeholder Engagement Presentation February 2022

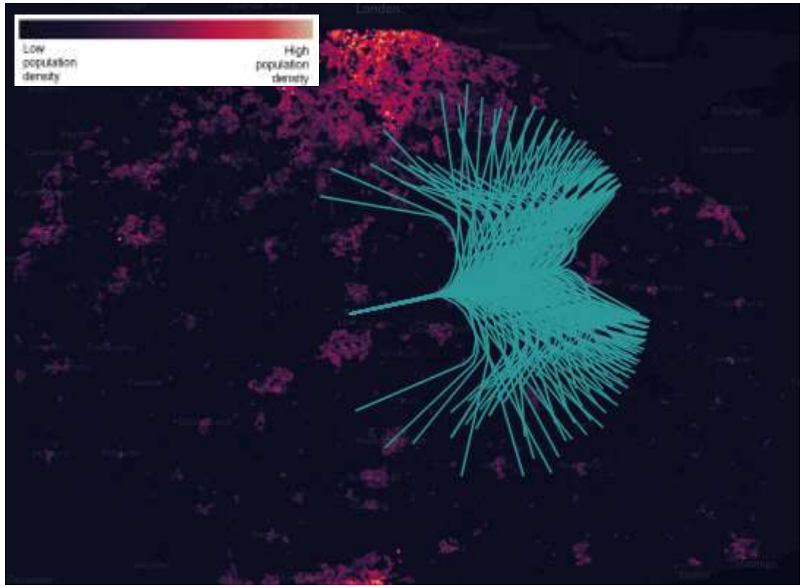
- We looked to the airspace design database for information on notional flight paths for westerly arrivals.

- Within the database we looked at the overflight noise metric; this calculates the total population overflown between 0-7000ft using the CAA's 48.5^{o} definition of overflight (CAP1498).

- We also checked the outcomes against the area of Areas of Outstanding Natural Beauty (AONB) overflown (measured in km^2 based on the 48.5^{o} CAP1498 definition of overflight).

Appendix A: Worked Example

- There are 198 notional flight paths serving westerly arrivals in the airspace design database:



Westerly arrival notional flight path flooding with population density map underlay

- The data indicated that the best notional flight path for population overflown between 0-7000ft overflew 6,233 people.

- The worst performing notional flight path overflew 112,020 people.

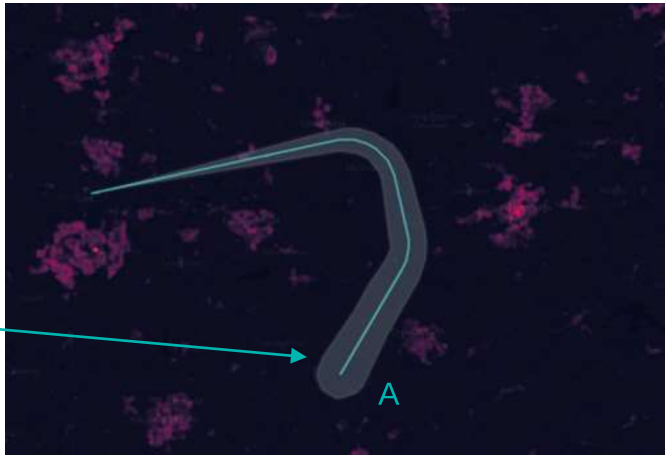
- When looking at AONB overflown, the best performing path overflew 75.15km^2 of AONB whereas the worst performing path overflew 77.9km^2.

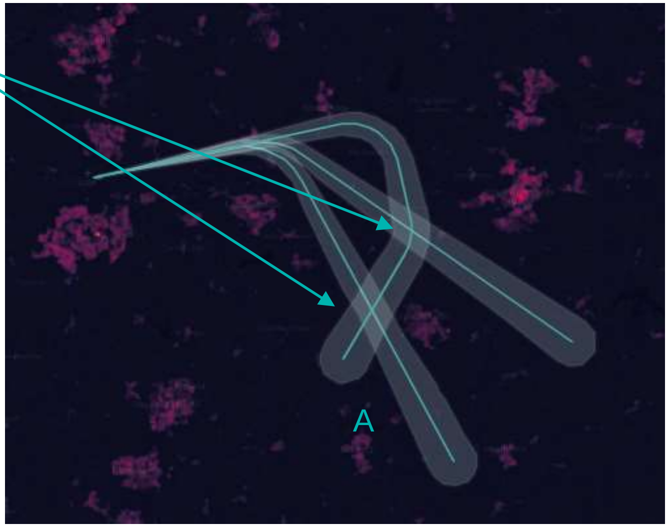
Total Number of Westerly Arrival Notional Flight Paths	198

	Total Population 0-7000ft (overflight)
Best performing notional flight path within database	6,233
Worst performing notional flight path within database	112,020
	Area of AONB (km^2)
Best performing notional flight path within database	75.15
Worst performing notional flight path within database	77.9

Appendix A: Worked Example

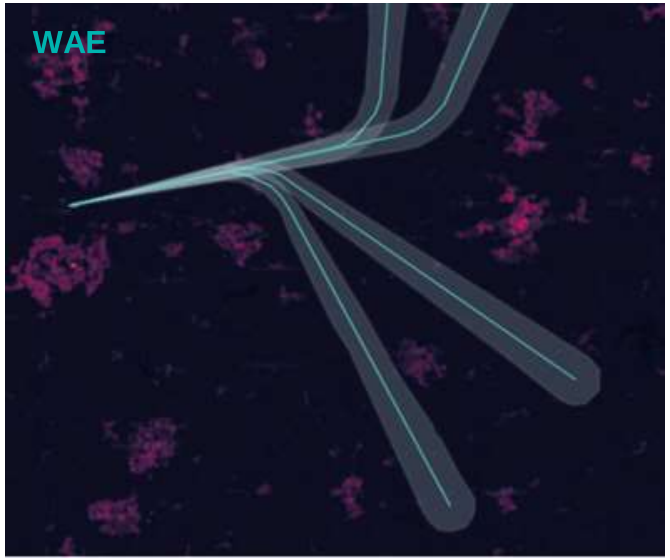
- The intention of these options is to offer multiple routes that can be alternated for respite. At this stage, we assume the majority of traffic will arrive from the south, and will be split equally down each southerly respite route.
- To start building the options, we took the best performing flight path for total population overflown (A) which overflies 6233 people. This route is also a separate option on the Comprehensive List (WAA).
- We then looked within the database and identified a group of high-performing flight paths that could potentially be operated alongside route A in order to create respite.
- In some cases, these high-performing notional flight paths shared overlapping overflight areas with route A, and therefore they would not meet DP7 and offer respite.
- To offer meaningful respite we aimed, as a minimum, to have separation of overflight cones between respite routes.



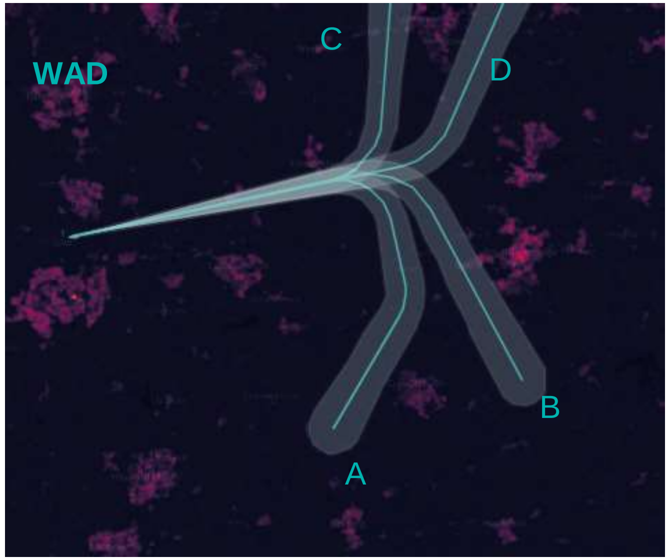


Appendix A: Worked Example

- The data from the database identified an alternative respite configuration which would not be compatible with the original route (A) selected. We therefore used this data to develop an alternative respite option (WAE).
- The two southerly arrival routes in WAE overfly 7100 and 6621 people.
- We also looked to the database to identify some routes from the north that we could include in the respite configuration.

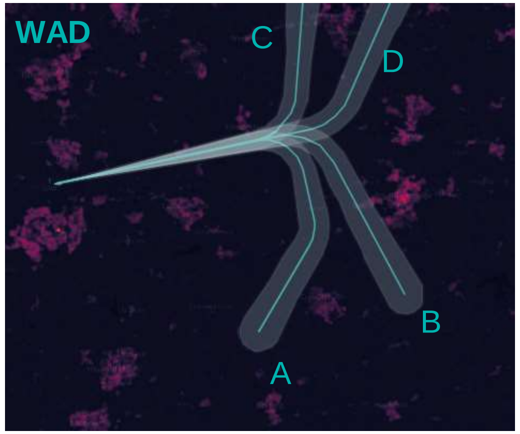
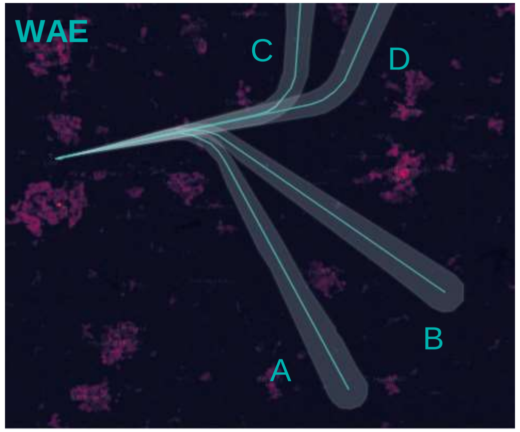


- Looking back to the original route A, we opened up the data within the database to identify a notional flight path that could be operated alongside route A in a respite configuration.
- This identified route B which overflies 10,654 people.
- The two arrival routes from the north remained the same between WAD and WAE because the data didn't suggest an alternative configuration for these northerly arrival routes.



Appendix A: Worked Example

- The following table provides an overview of the data used to build the two options.
- Both options were added to the comprehensive list of options.
- At this stage, when we were building these options, we had considered DP1 safety by design, DP3 Limit adverse noise effects, DP5 resilience, DP8 deconfliction by design and DP9 locally tailored designs. We also ensured the options were compatible with DP4 time based arrival operations and DP2 enhanced navigation standards.
- Other options on the Comprehensive list considered other Design Principles such as DP6 Optimise Use of Aircraft Capabilities.

Option	Route	Total Population 0-7000ft (CAP1498 overflight)	Total of all notional flight paths	Area of AONB	Option images (Overflight contours between 0-7000ft with overflight cone. Overflight based on CAP1498 definition of overflight)
WAD	A	6,233	35899	76.49	
	B	10,654		76.67	
	C (Same notional flight path for both options)	11,179		75.94	
	D (Same notional flight path for both options)	7,833		76.08	
WAE	A	7,100	32733	75.55	
	B	6,621		76.1	
	C (Same notional flight path for both options)	11,179		75.94	
	D (Same notional flight path for both options)	7,833		76.08	

Appendix A: Worked Example

Design Principle Evaluation

- After testing the options with stakeholders, we then moved on to the Design Principle Evaluation.

- The Design Principle Evaluation is a high level, mainly qualitative assessment where each option is assessed against each design principle and categorised as either ‘met’, ‘partially met’ or ‘not met’.

- Based on the methodology used to assess the DP3 (Limit adverse noise effects), both options WAD and WAE met this design principle.

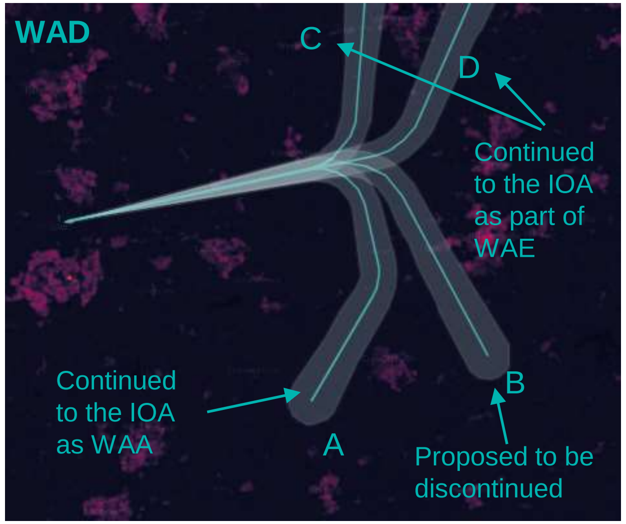
- When looking at the other Design Principles, the evaluation of DP6 (Optimise use of aircraft capabilities) found that option WAD increased track mileage compared to the average arrival baseline whereas WAE decreased (improved) track mileage. We used initial indicative information about the future arrivals delay mechanism above 7000ft to calculate track mileage and connected all the arrivals routes to this common point. At this early stage in the process, this point is considered a fair assumption that allows us to compare track mileage.

- The safety assessment (DP1) also identified that WAE had marginally better safety performance.

- We, therefore, proposed discontinuing WAD and progressing WAE to the Initial Options Appraisal.

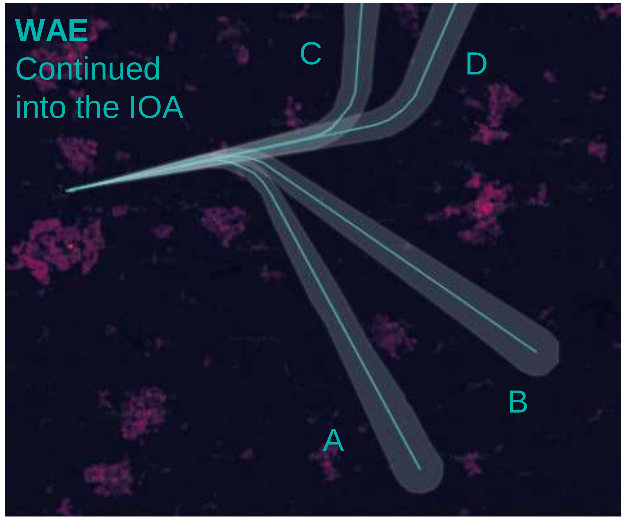
Appendix A: Worked Example

- Although we were proposing to discontinue WAD, three of the four routes would continue into the IOA.
- WAD Route A is already an option (WAA), and
- WAD Routes C and D are contained within WAE.
- Therefore only WAD route B would be discontinued.



As part of the engagement on the Design Principle Evaluation, some stakeholders told us that their preference would be for all the arrival options to continue to the Initial Options Appraisal and be subject to further noise analysis before any are discontinued.

GAL has considered this feedback and will include all PBN arrival options (including the four options that we had proposed to discontinue - WAD, WAI, EAK and EAE) in the Initial Options Appraisal.



Option Images

The following slides contain images and details of the options which will proceed to the Step 2B Initial Options Appraisal (IOA). This slide pack should be read in conjunction with the Stakeholder presentation.

Please note that **all airspace design options are subject to change throughout the airspace change process** as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

Understanding the Option Images: Departures

Going into the IOA the departure options are now built with groups of routes which create swathes. Today's existing centerlines have also been incorporated into the groups. For more information, please see the Stakeholder Engagement Presentation circulated with these options images.

The routes will be used to generate data that allows analysis of the benefits and impacts compared to the do nothing baseline. As we progress through the process, the swathes will be refined until the point where we have a single route centerline that serves each network exit point.

Option Swathe
Route 0-7000ft (6% Climb)
Route 7000ft + (Outside the scope of this ACP)

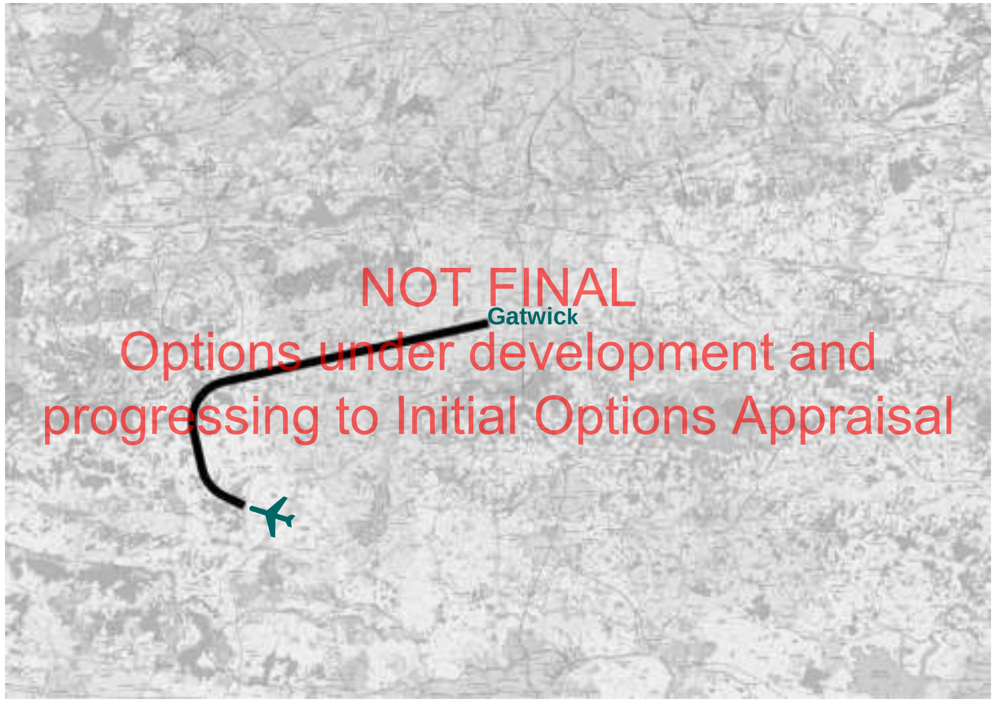
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

Understanding the Option Images: Arrivals

The images of the arrival options (other than the Radar Maneuvering Area (RMA)) show a PBN route centerline between 7000ft to landing based on a standard 3º continuous descent.

It’s important to note that, at the point of implementation, it is anticipated that the time-based arrival operation technology required from the network (airspace above 7000ft) to operate solely PBN arrivals will not be available, and therefore we expect there will be a necessity for some tactical controlling (vectoring) of aircraft particularly during peak periods alongside the operation of PBN arrival options.



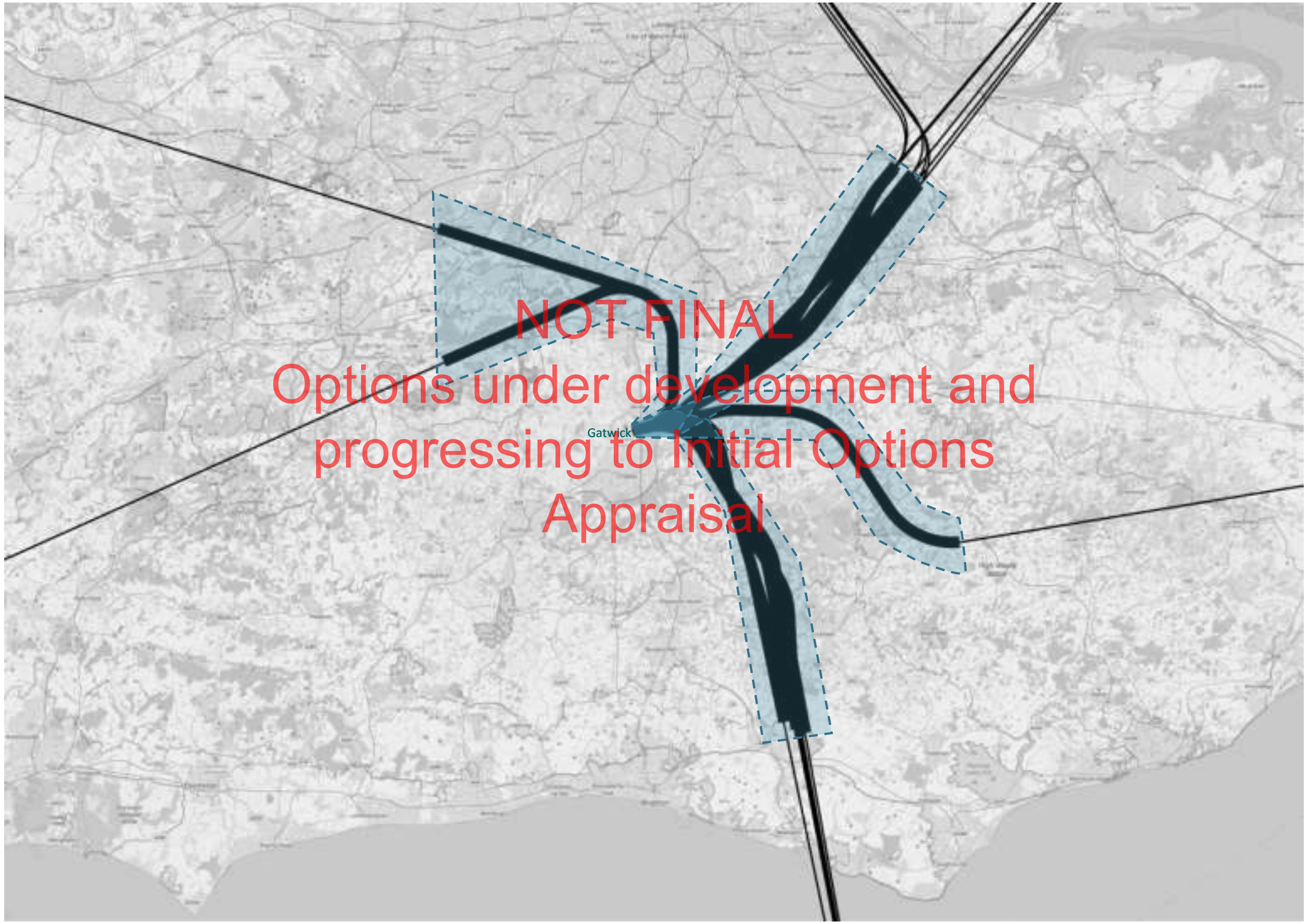
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

7000-0 (3º descent)

YOUR LONDON AIRPORT Gatwick

Departures

Departures
Easterly System 1



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Easterly System 2

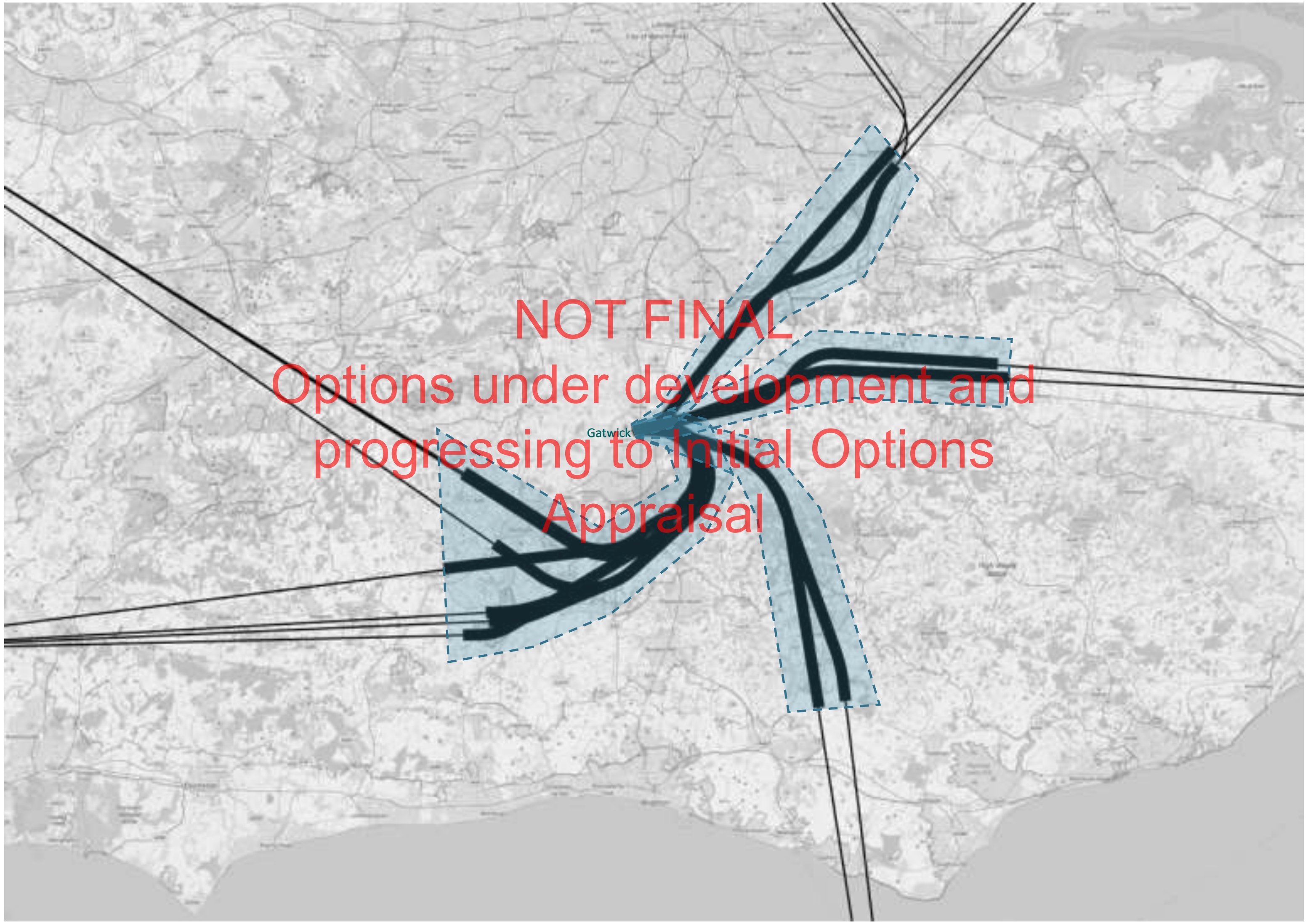
Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Easterly System 3

Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

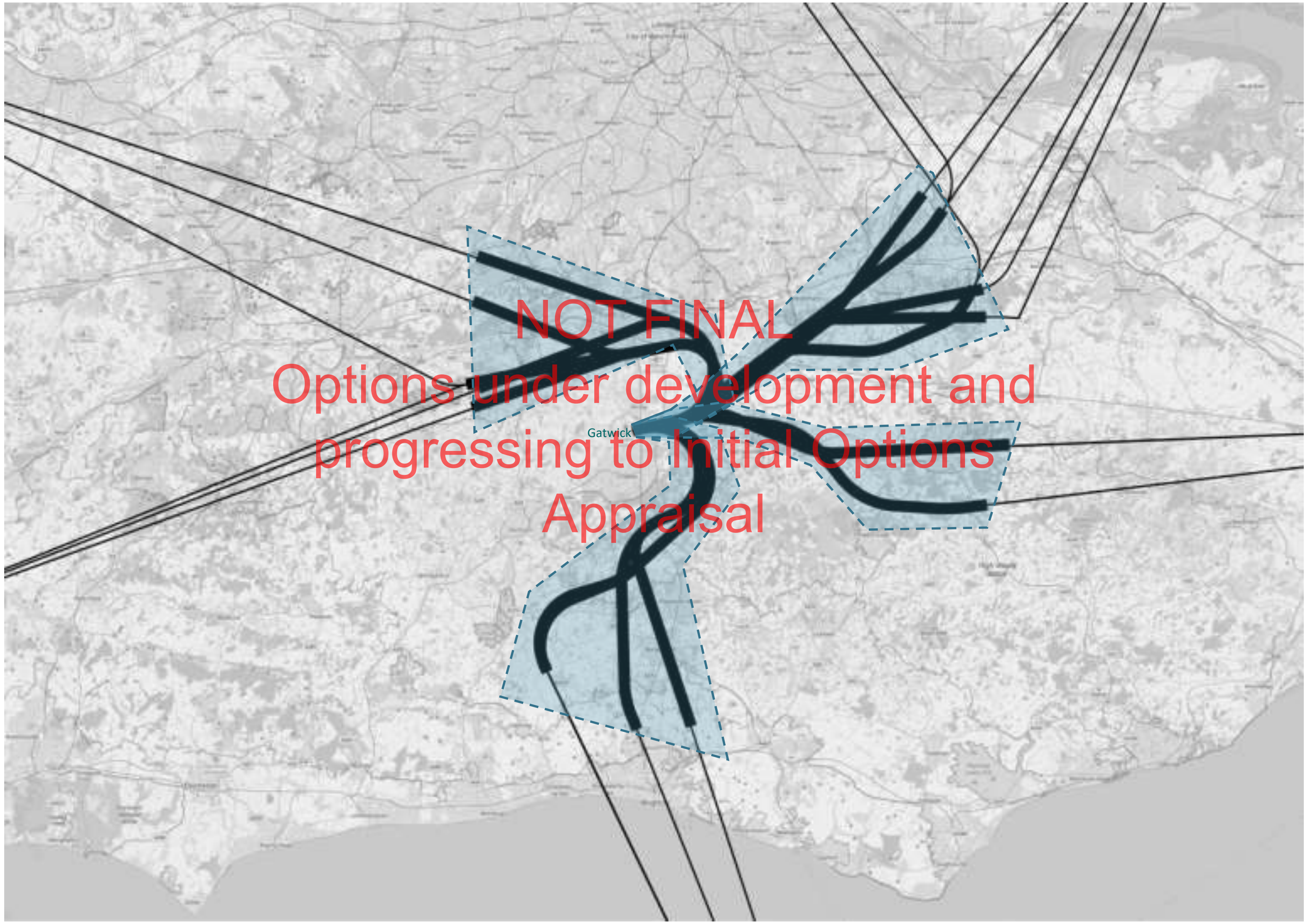


Departures
Easterly System 4

Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Easterly System 5

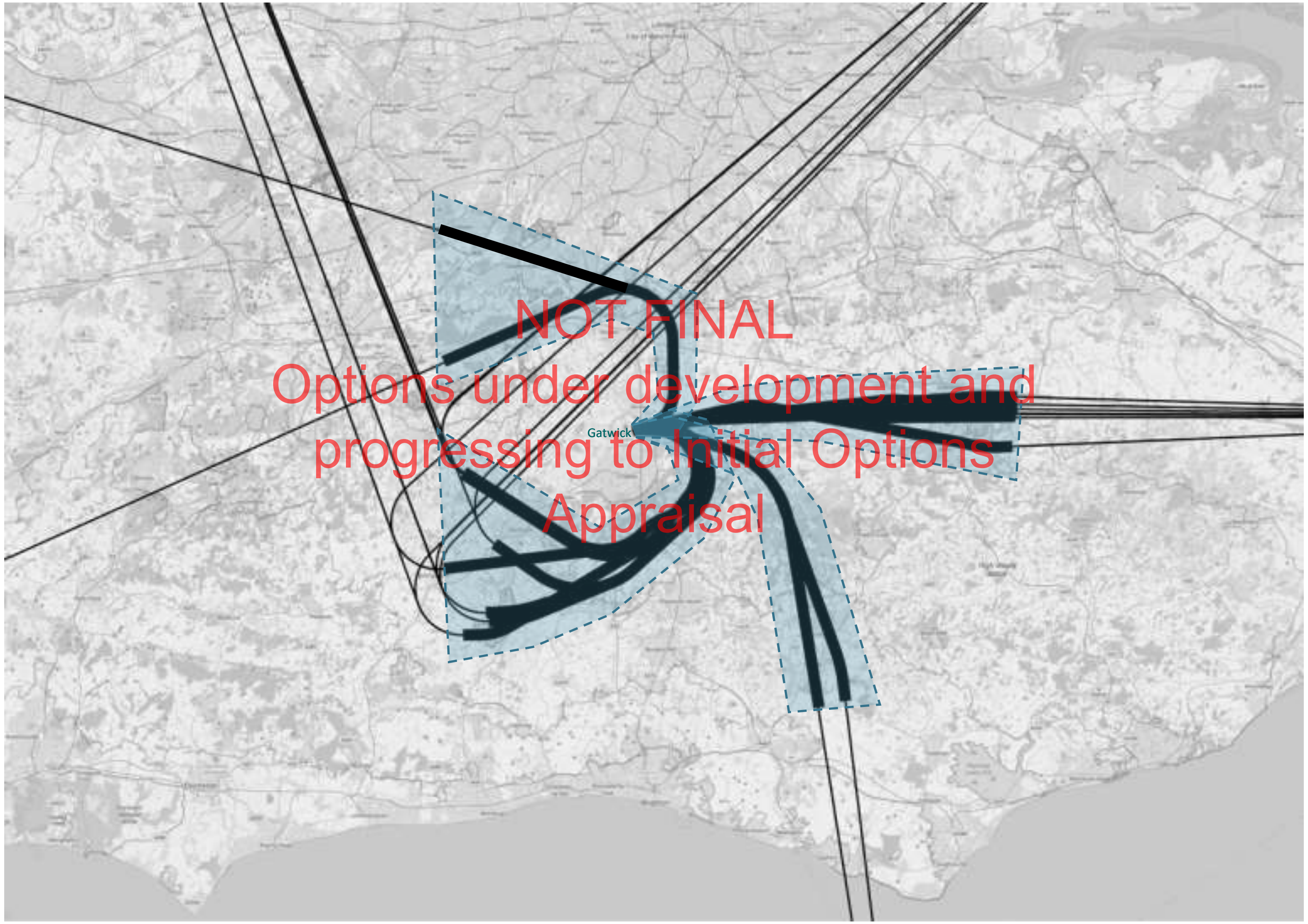


Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT
Gatwick

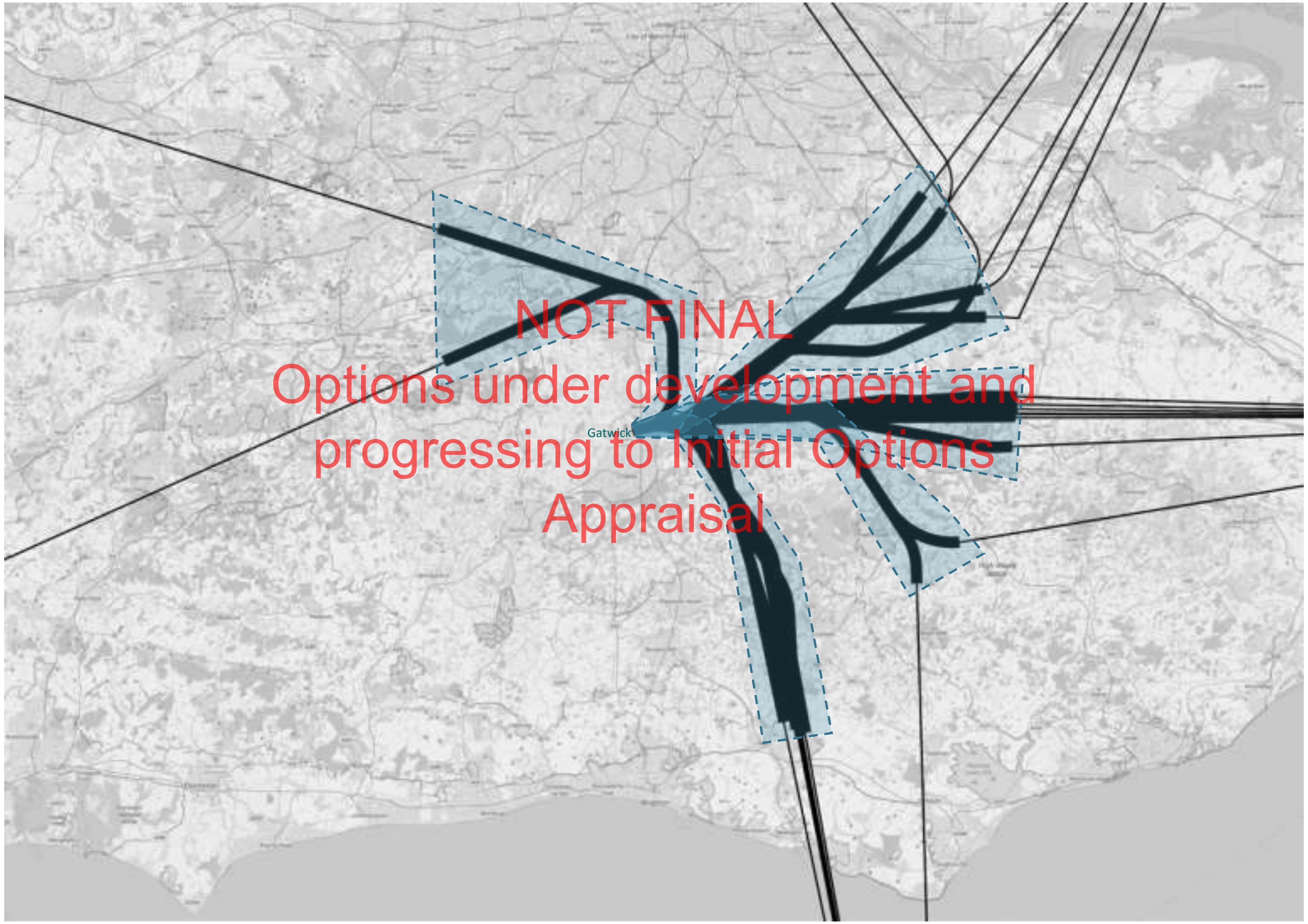
Departures
Easterly System 6



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Easterly System 7

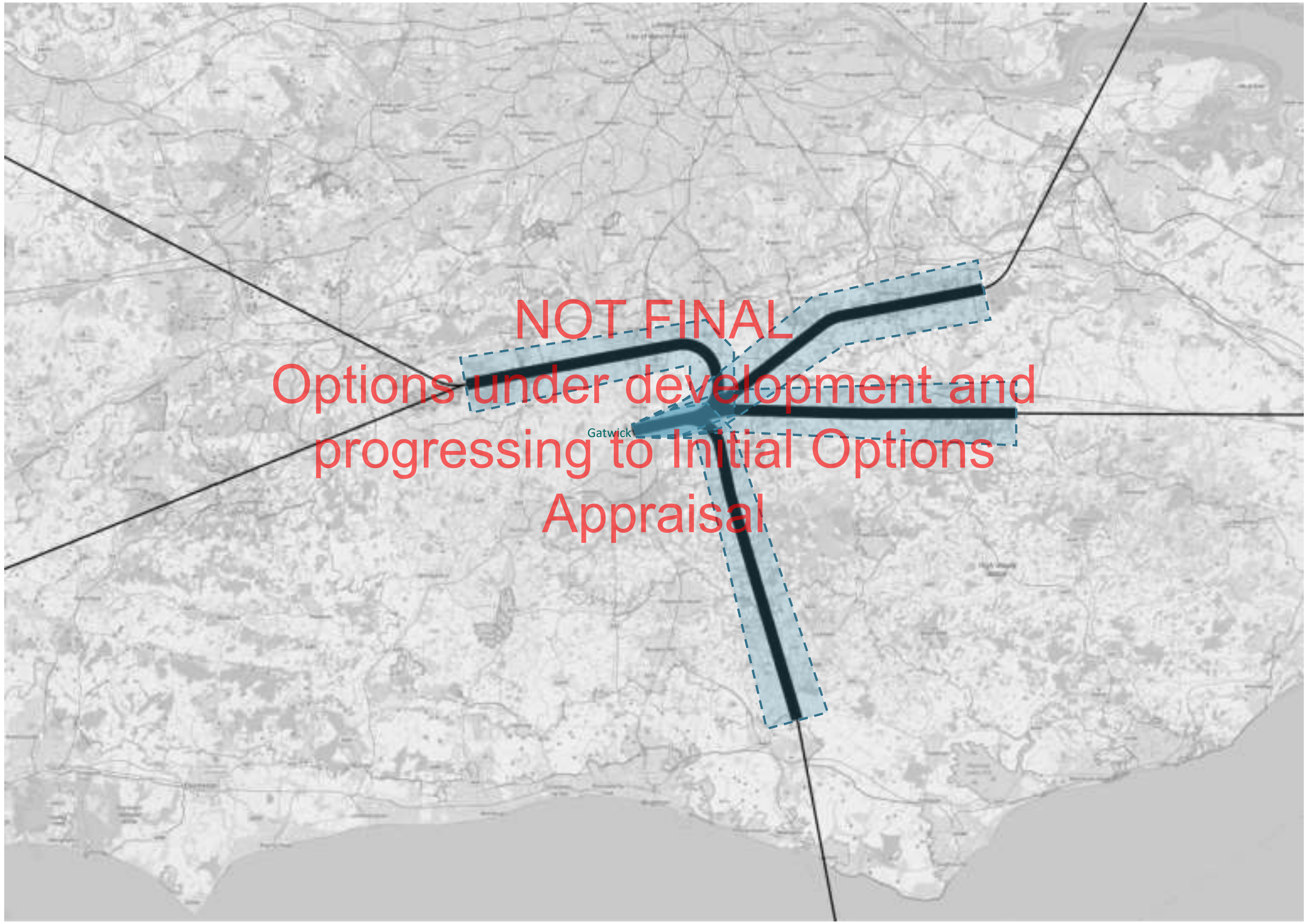


Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT
Gatwick

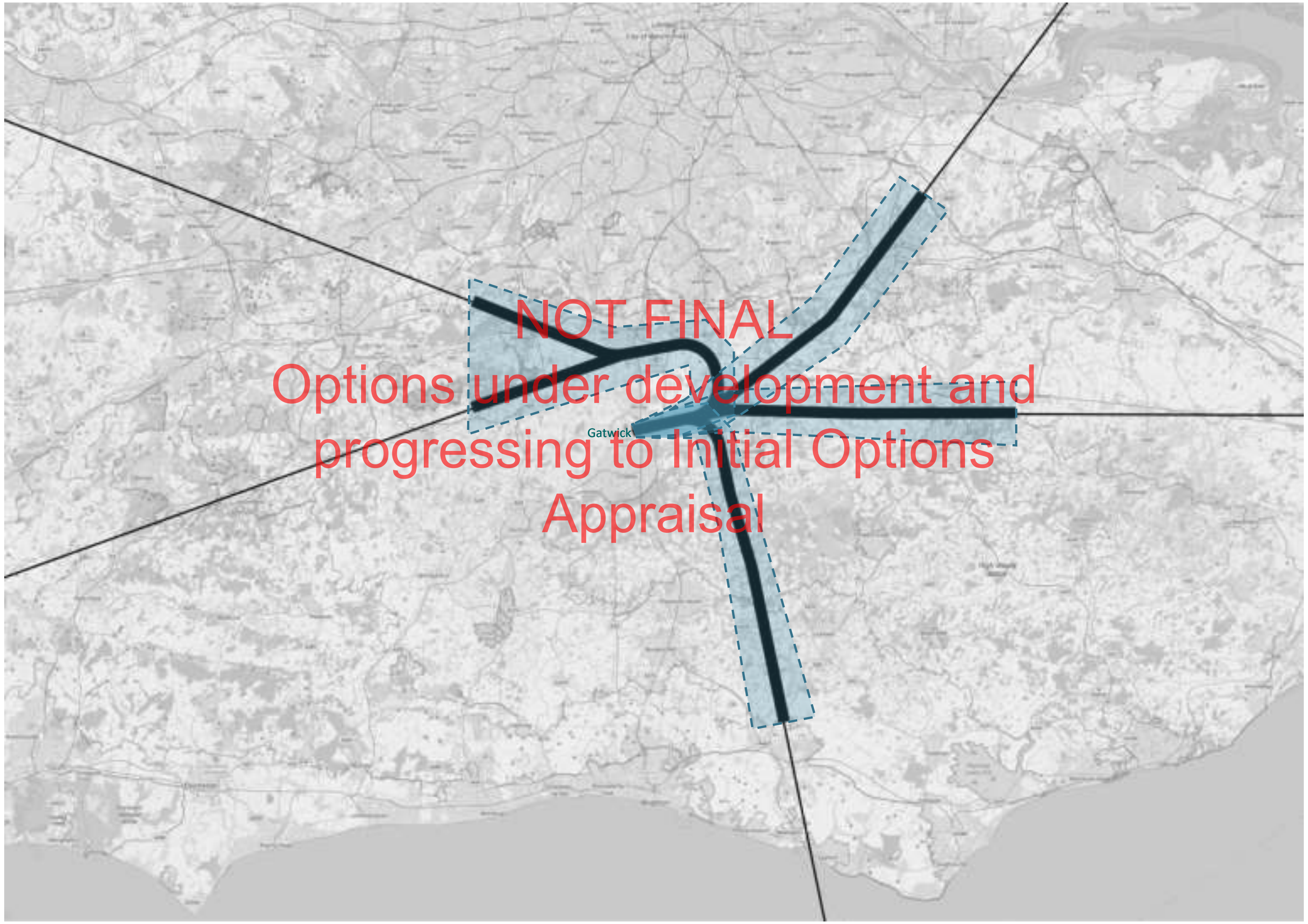
Departures
Easterly System 8



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

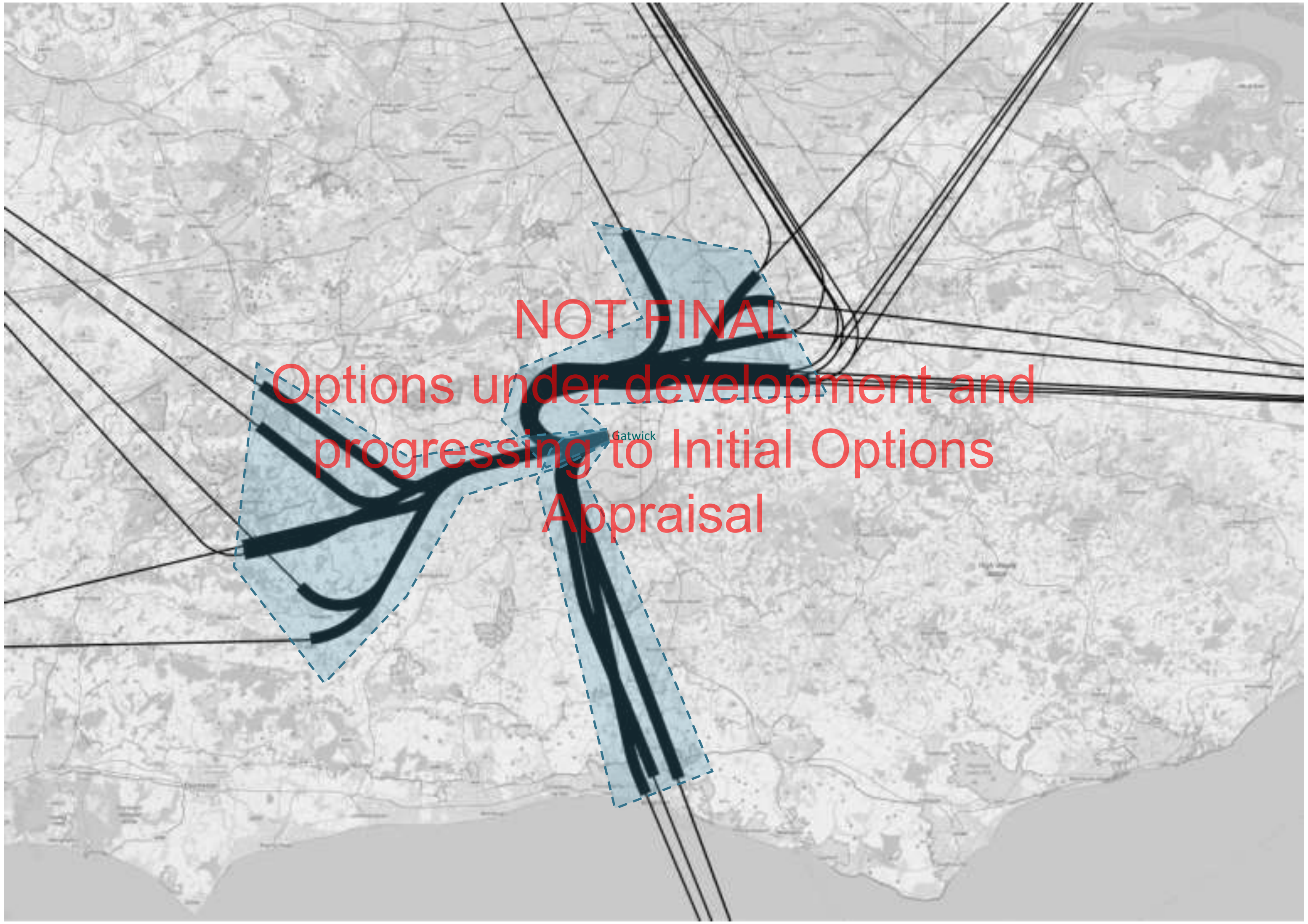
Departures
Easterly System 9



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Westerly System 1



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT
Gatwick

Departures
Westerly System 2

Option Swathe
0-7000ft (6% Climb)
7000ft +

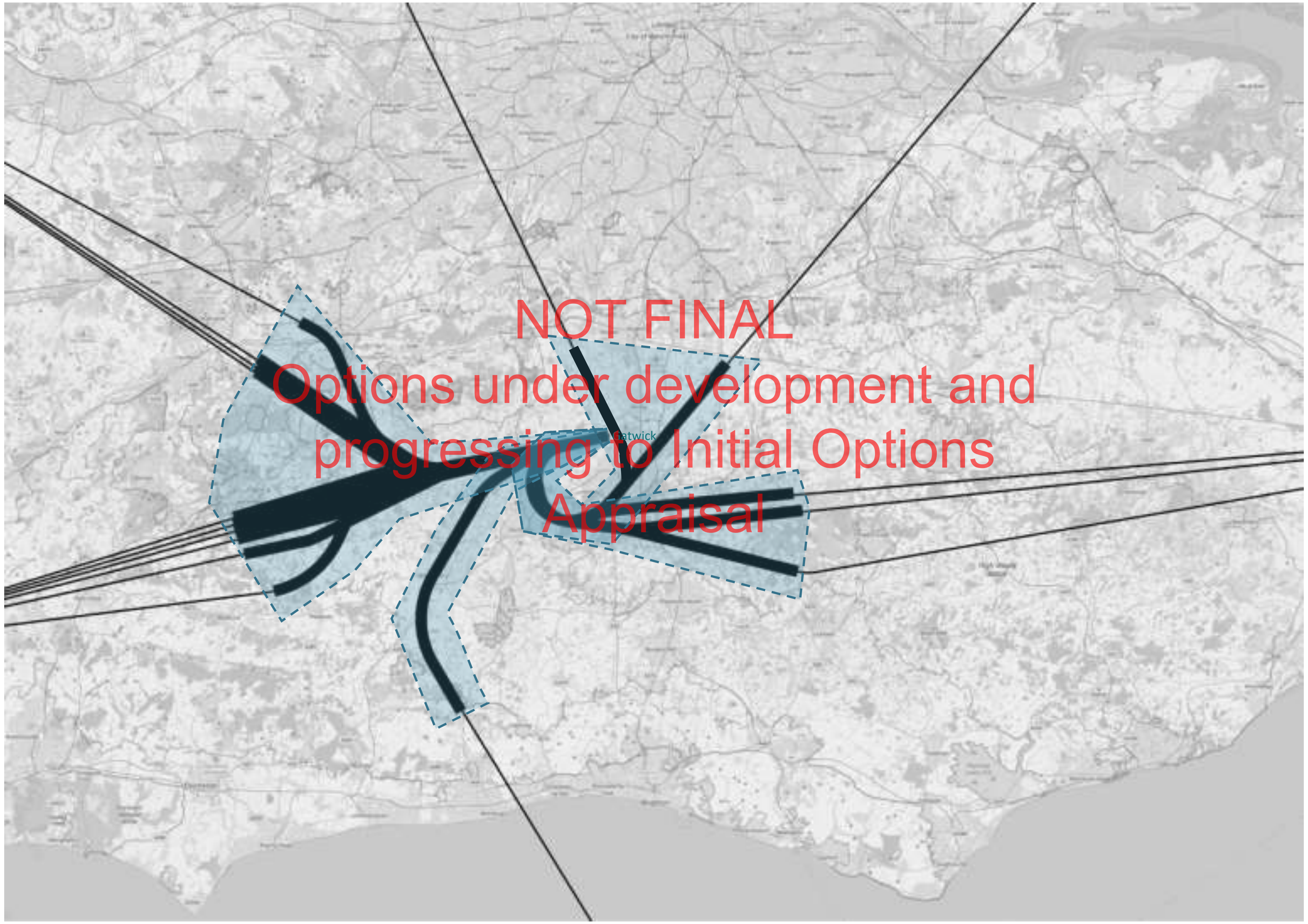
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Westerly System 3

Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Westerly System 4



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Westerly System 5

Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT Gatwick

Departures Westerly System 6

Option Swathe
0-7000ft (6% Climb)
7000ft +

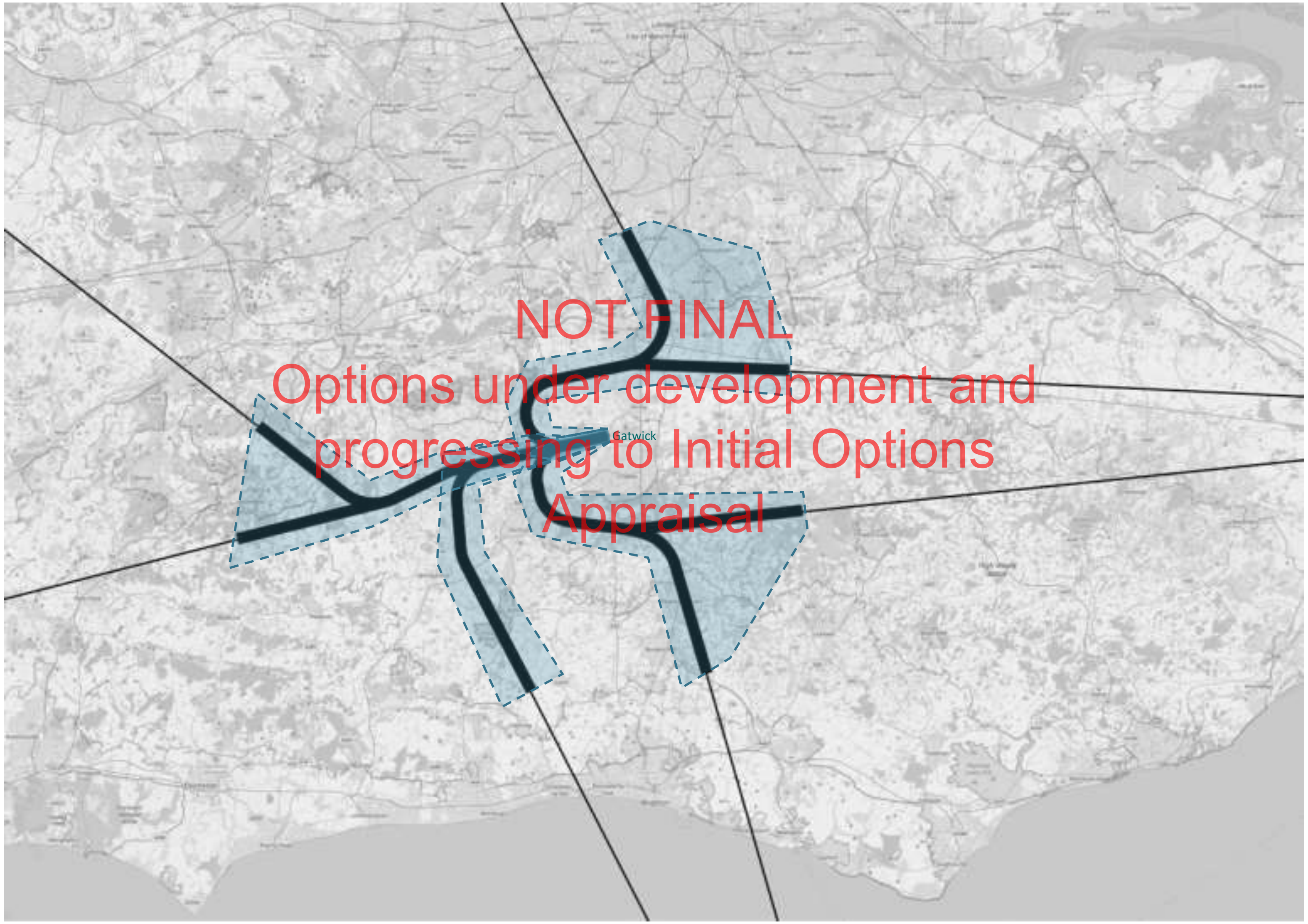
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Westerly System 7

Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Departures
Westerly System 8



Option Swathe
0-7000ft (6% Climb)
7000ft +

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

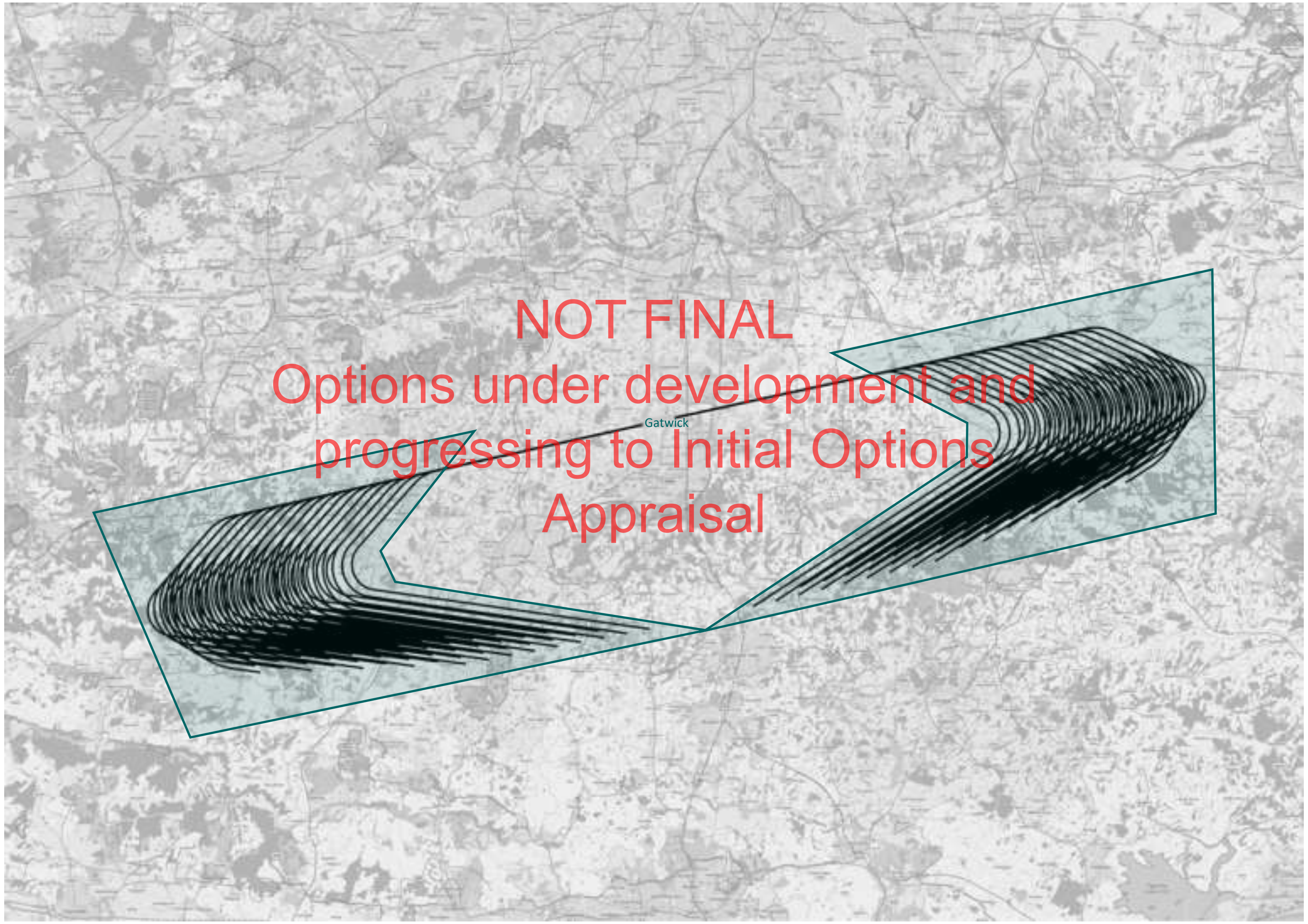
Arrivals

Arrivals
Westerly RMA

Note:
The paths shown are not PBN routes or proposed options. These notional flight paths are for the purposes of IOA noise and environmental analysis

Radar Manoeuvring Area (RMA) 0-7000ft (Sometimes called a vectoring area)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
EAA

Note: To be operated alongside an RMA

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

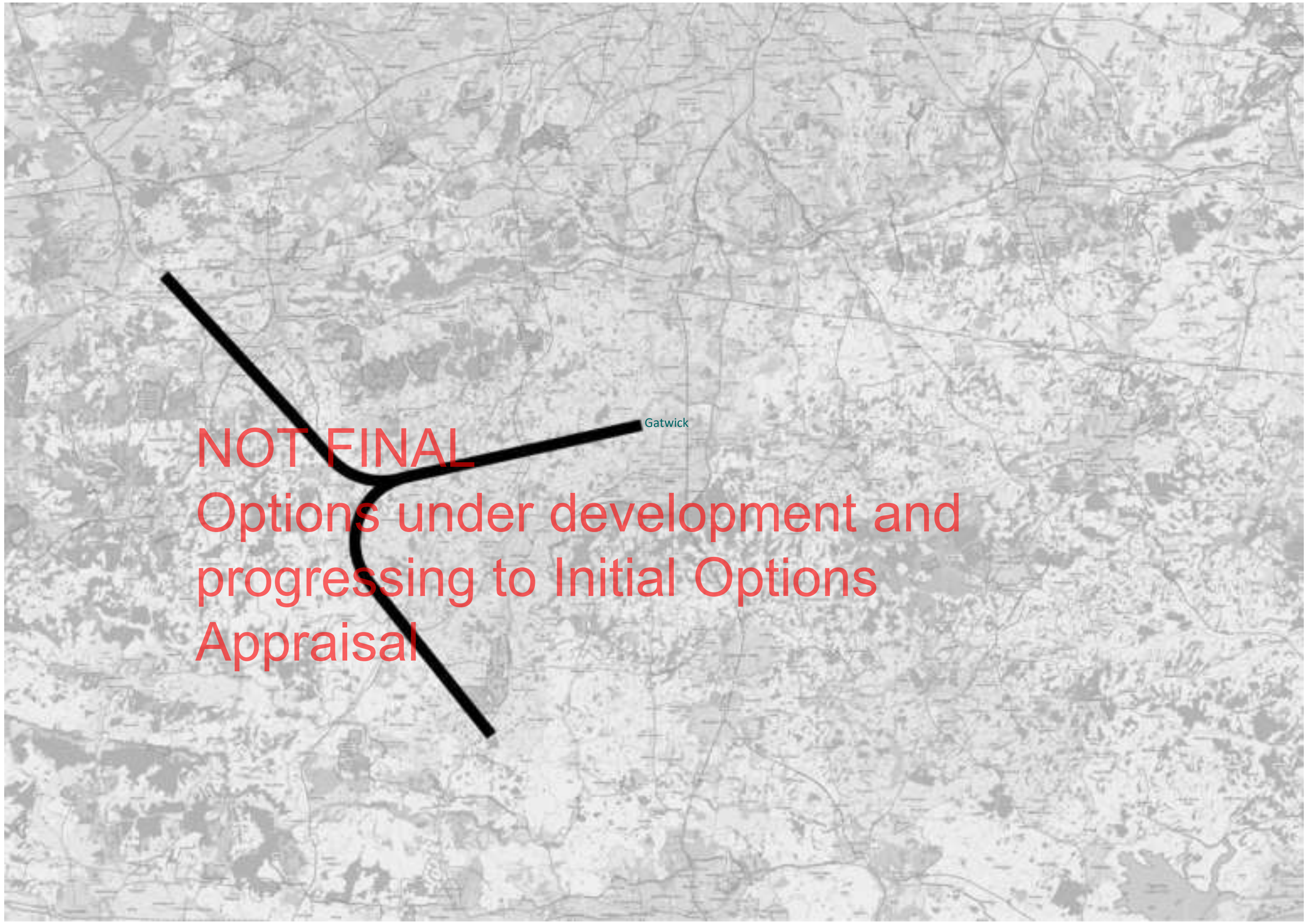
Arrivals
EAC

Note: To be operated alongside an RMA

PBN Arrival from the north on a tactical basis

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
EAD

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
EAE

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally.

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT Gatwick

Arrivals
EAF

Note: To be operated alongside an RMA

PBN arrival from the north on a tactical basis

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

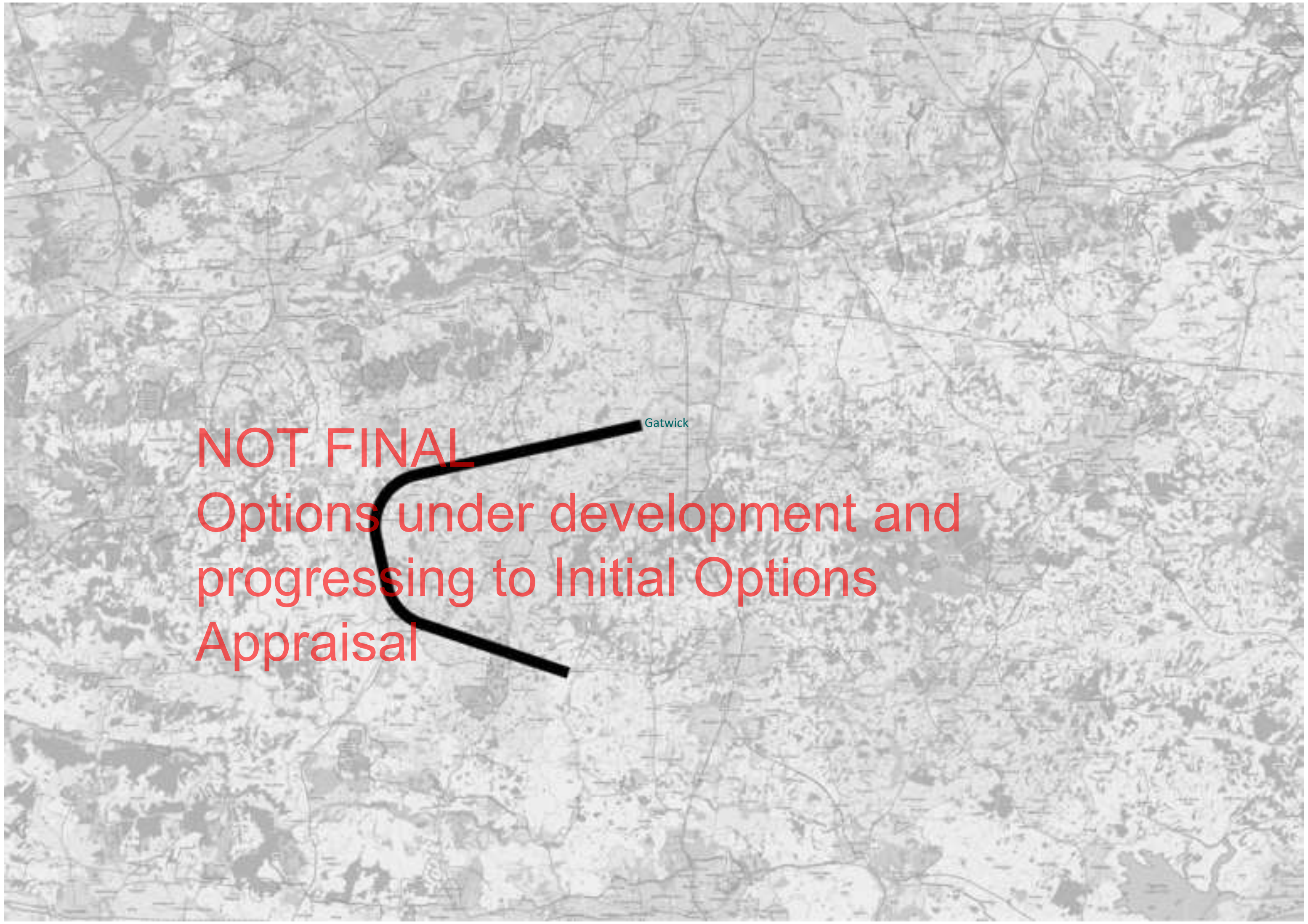
YOUR LONDON AIRPORT
Gatwick

Arrivals
EAG

Note: To be operated alongside an RMA

7000-0 (3º descent)

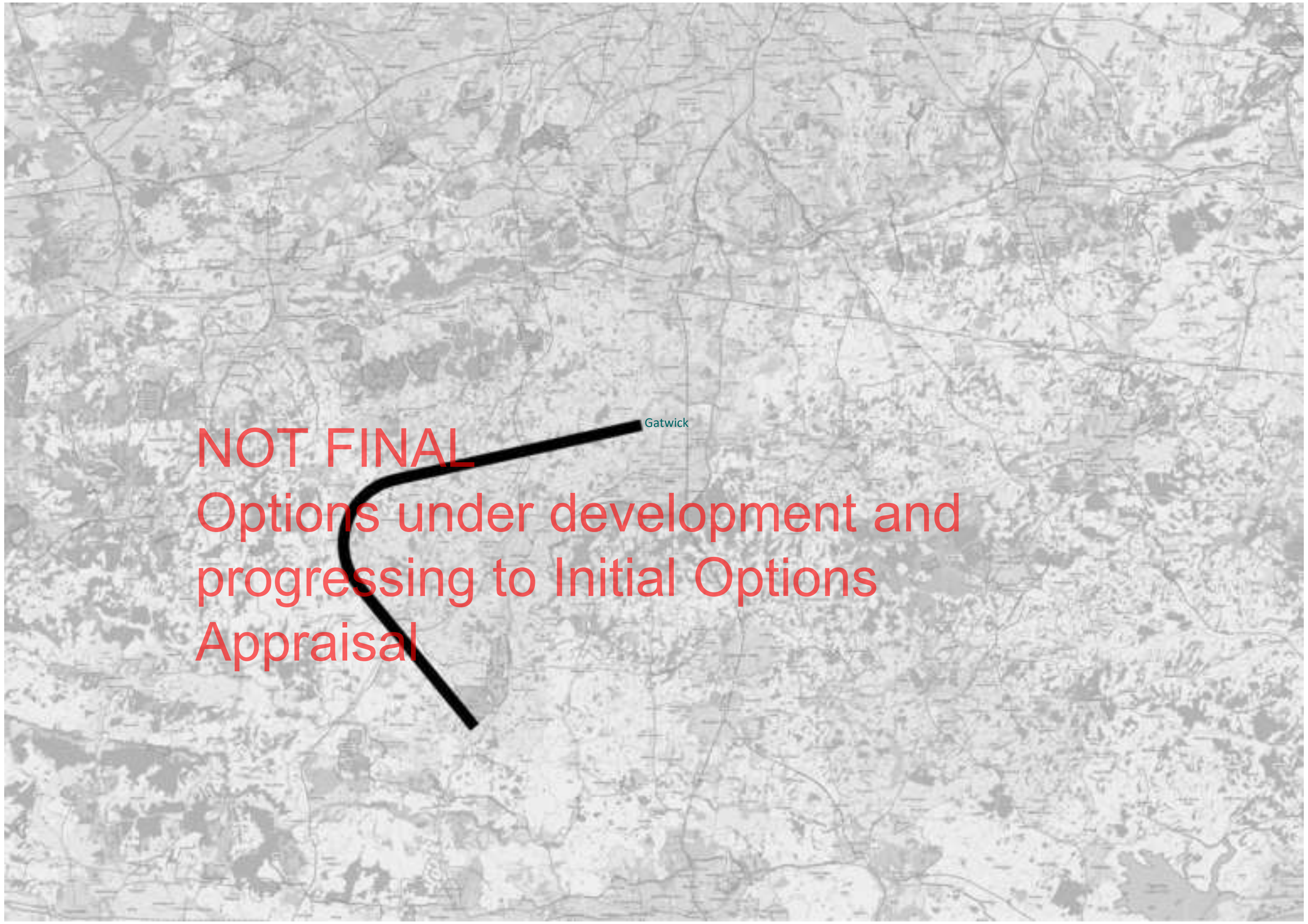
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



YOUR LONDON AIRPORT Gatwick

Arrivals
EAI

Note: To be operated alongside an RMA



7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
EAJ

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

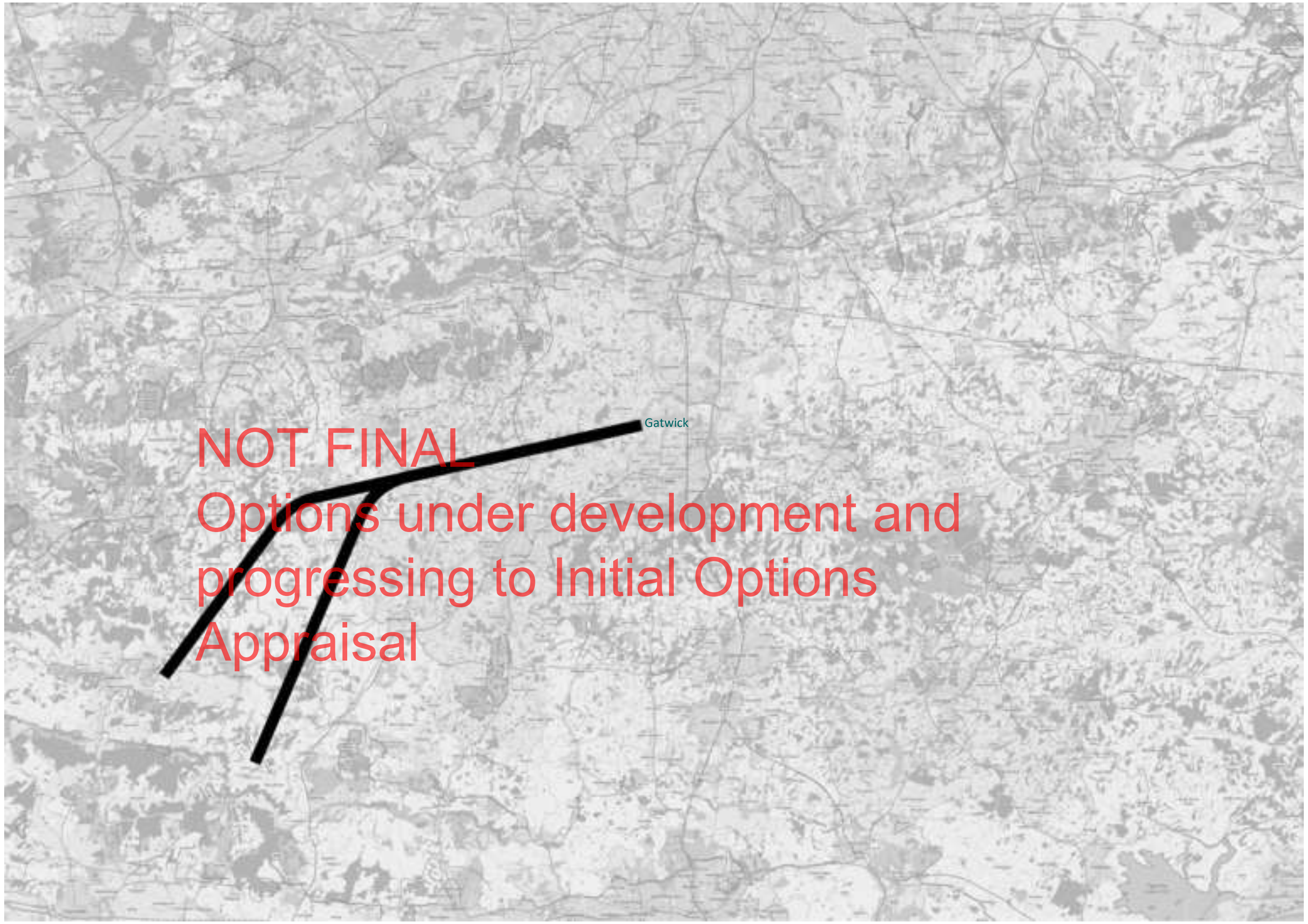
Arrivals
EAK

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally

7000-0 (3º descent)

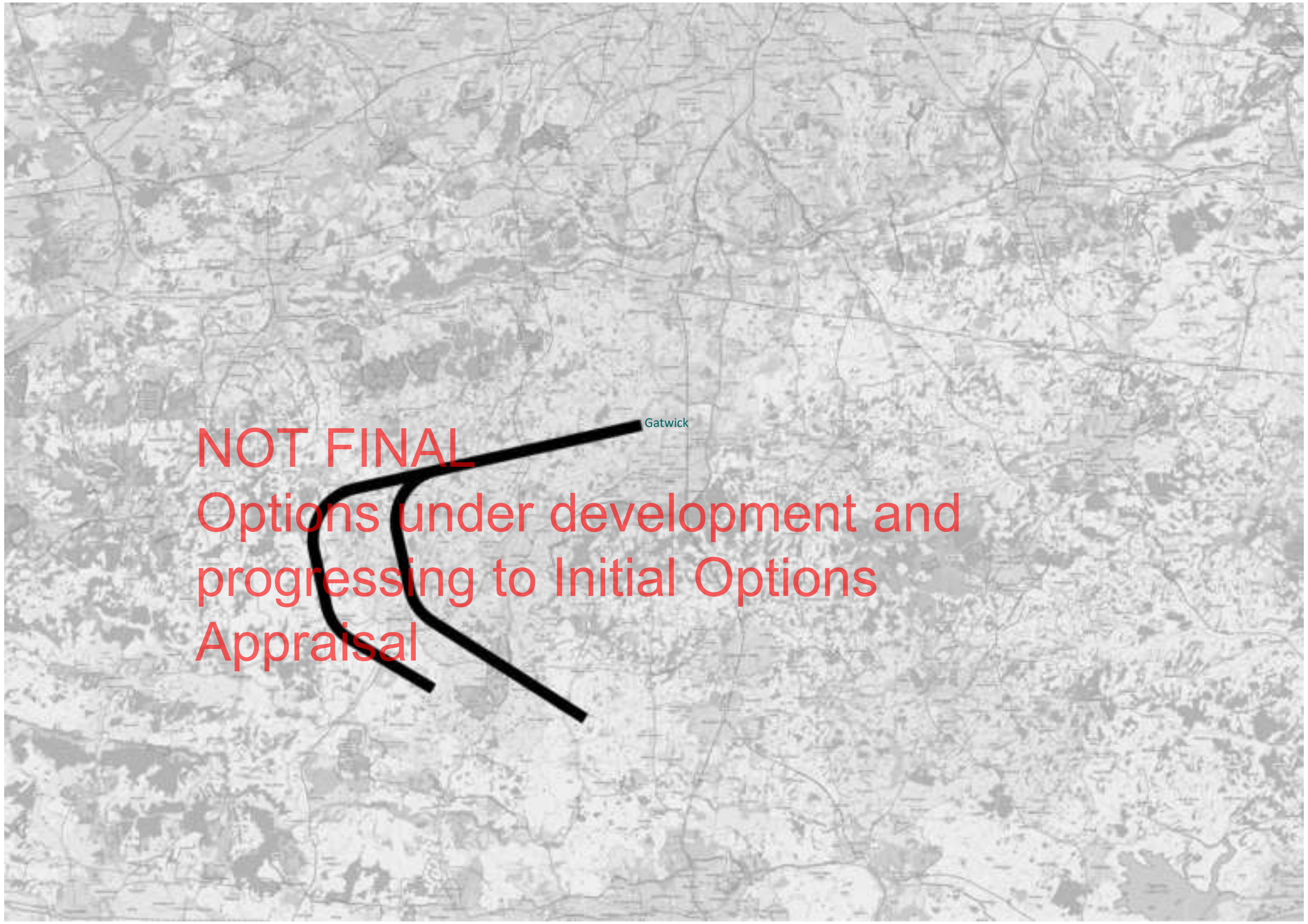
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
EAL

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally

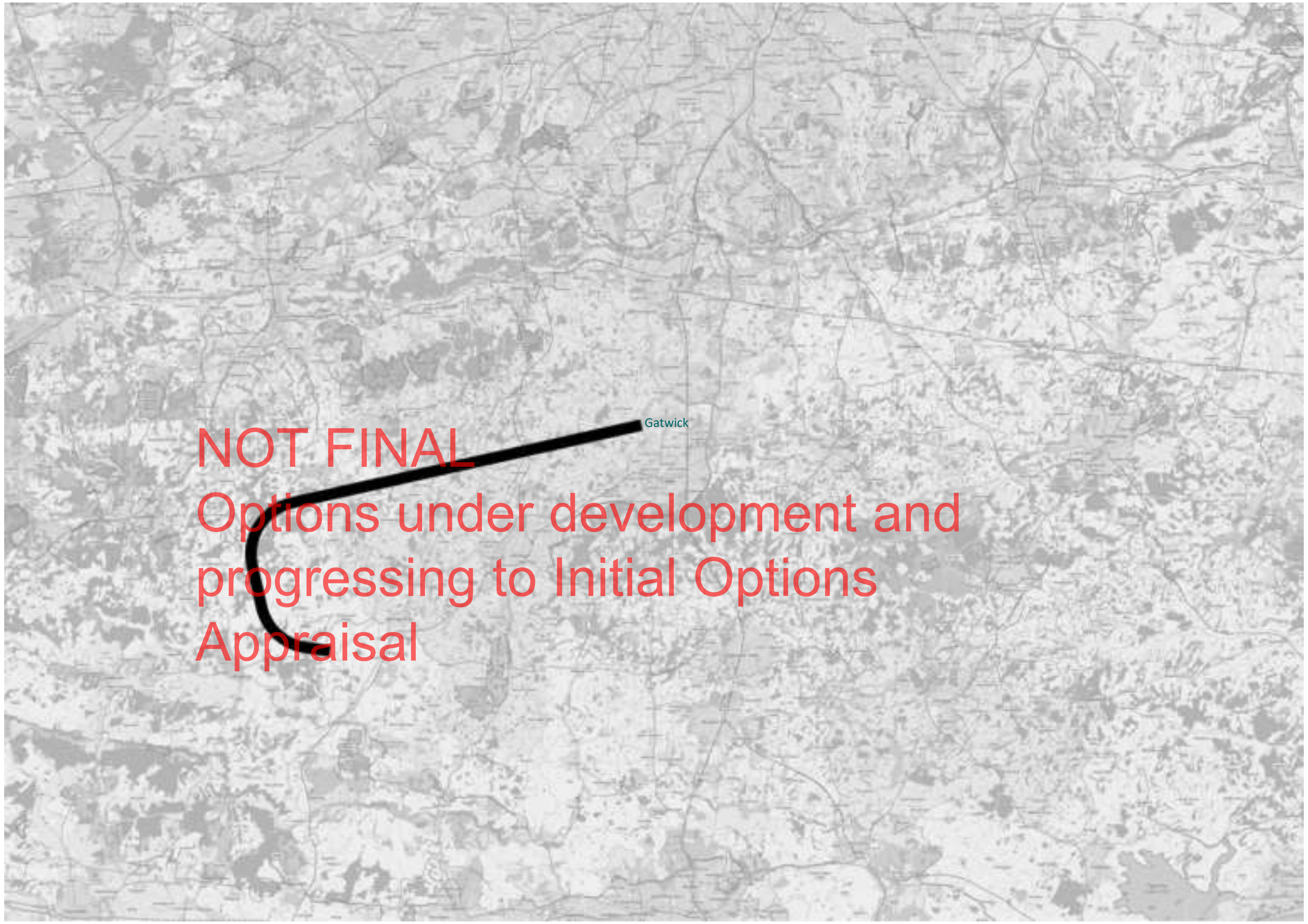


7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
EAM

Note: To be operated alongside an RMA



7000-0 (3^o descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

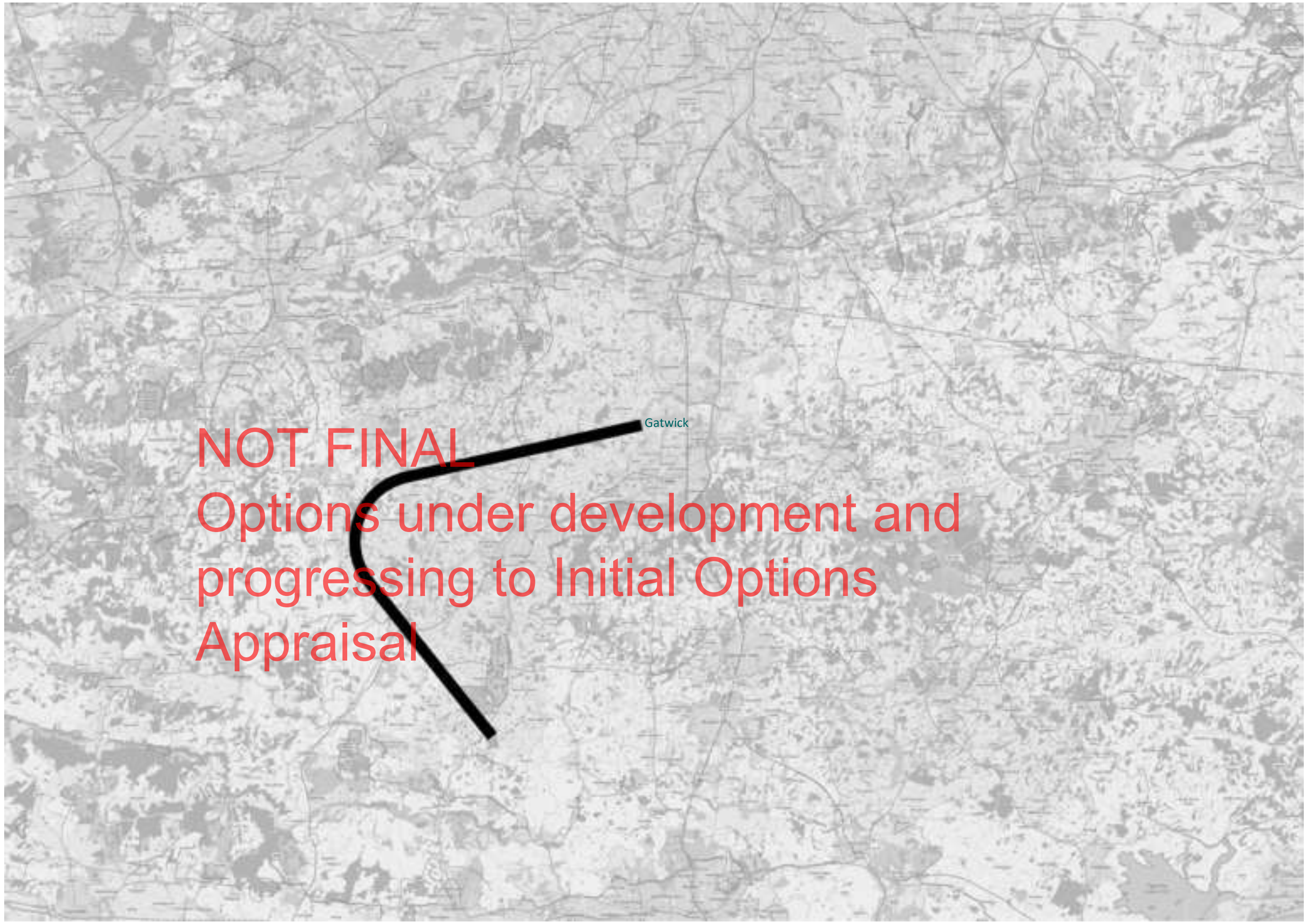
YOUR LONDON AIRPORT Gatwick

Arrivals
EAN

Note: To be operated alongside an RMA

7000-0 (3º descent)

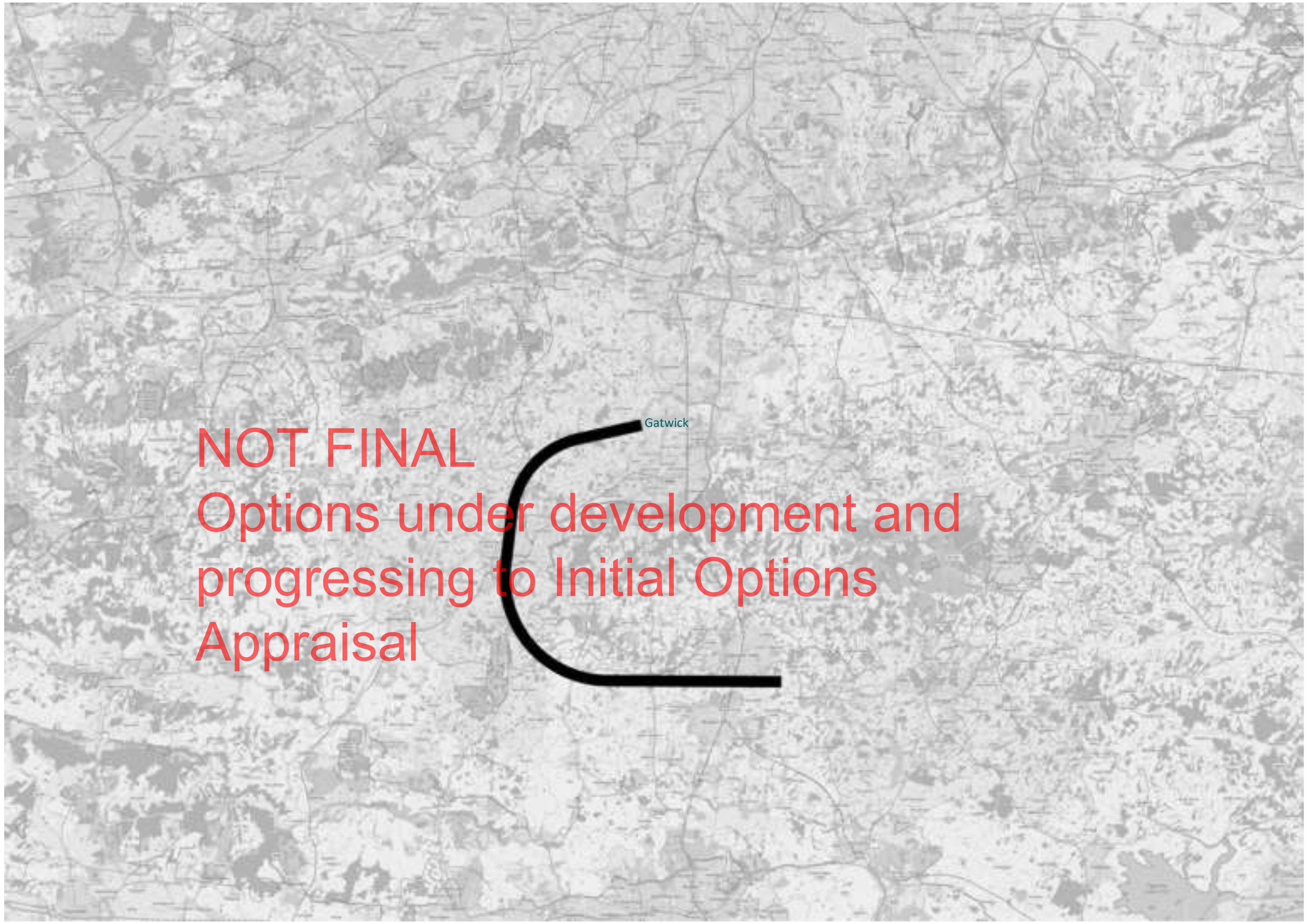
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
EAO

Note: To be operated alongside an RMA

RNP-AR route



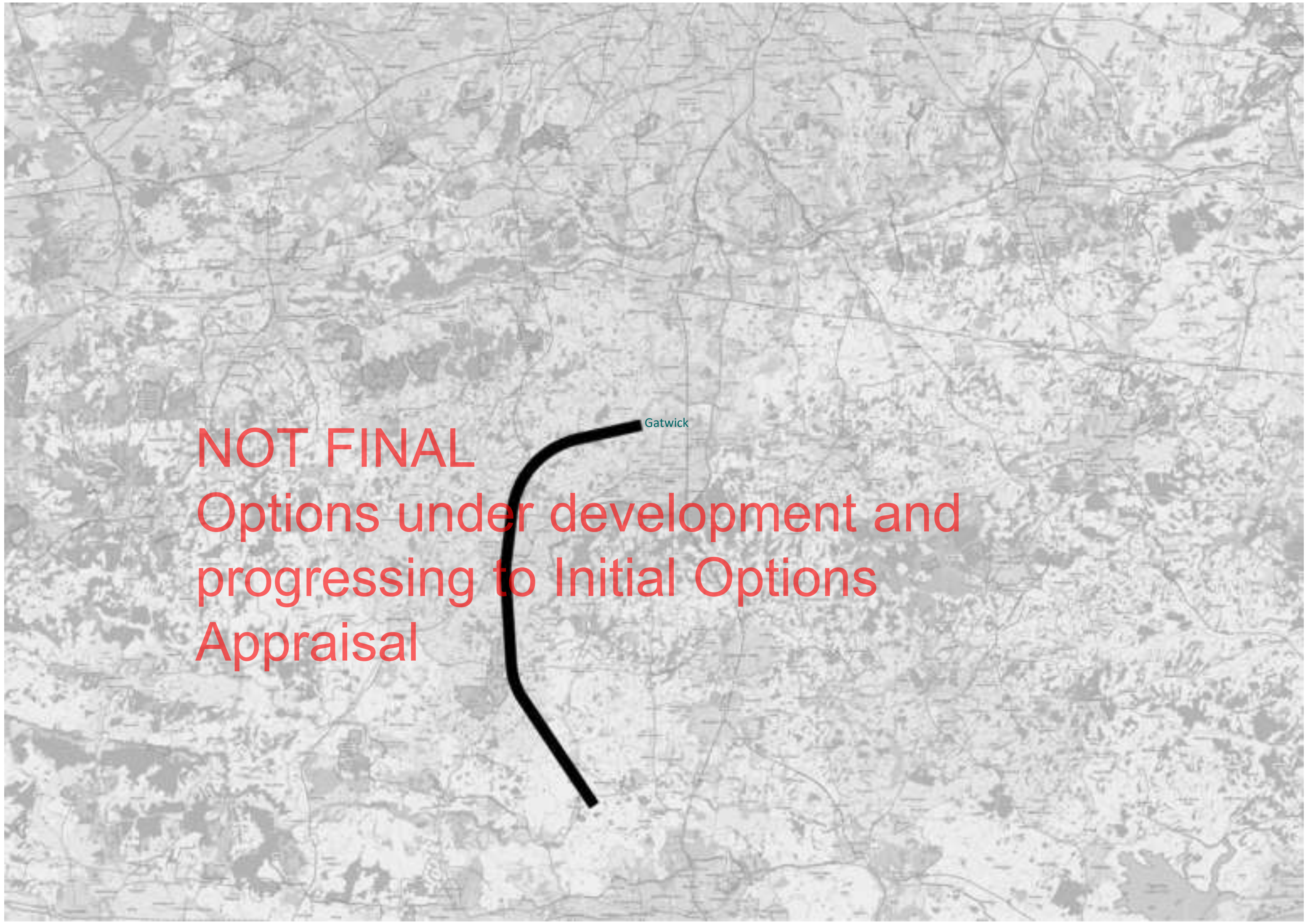
7000-0 (3^o descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
EAP

Note: To be operated alongside an RMA

RNP-AR route

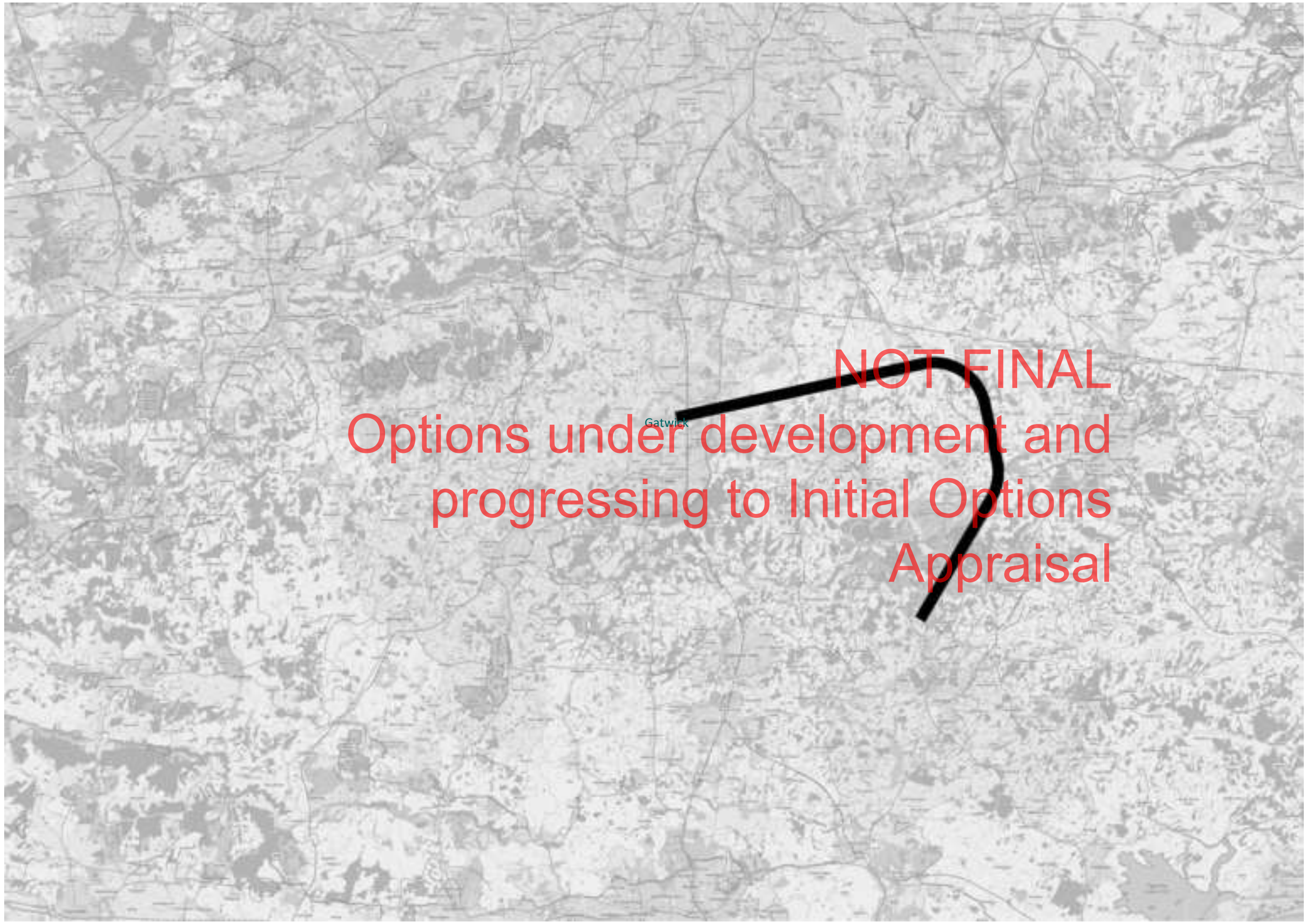


7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
WAA

Note: To be operated alongside an RMA

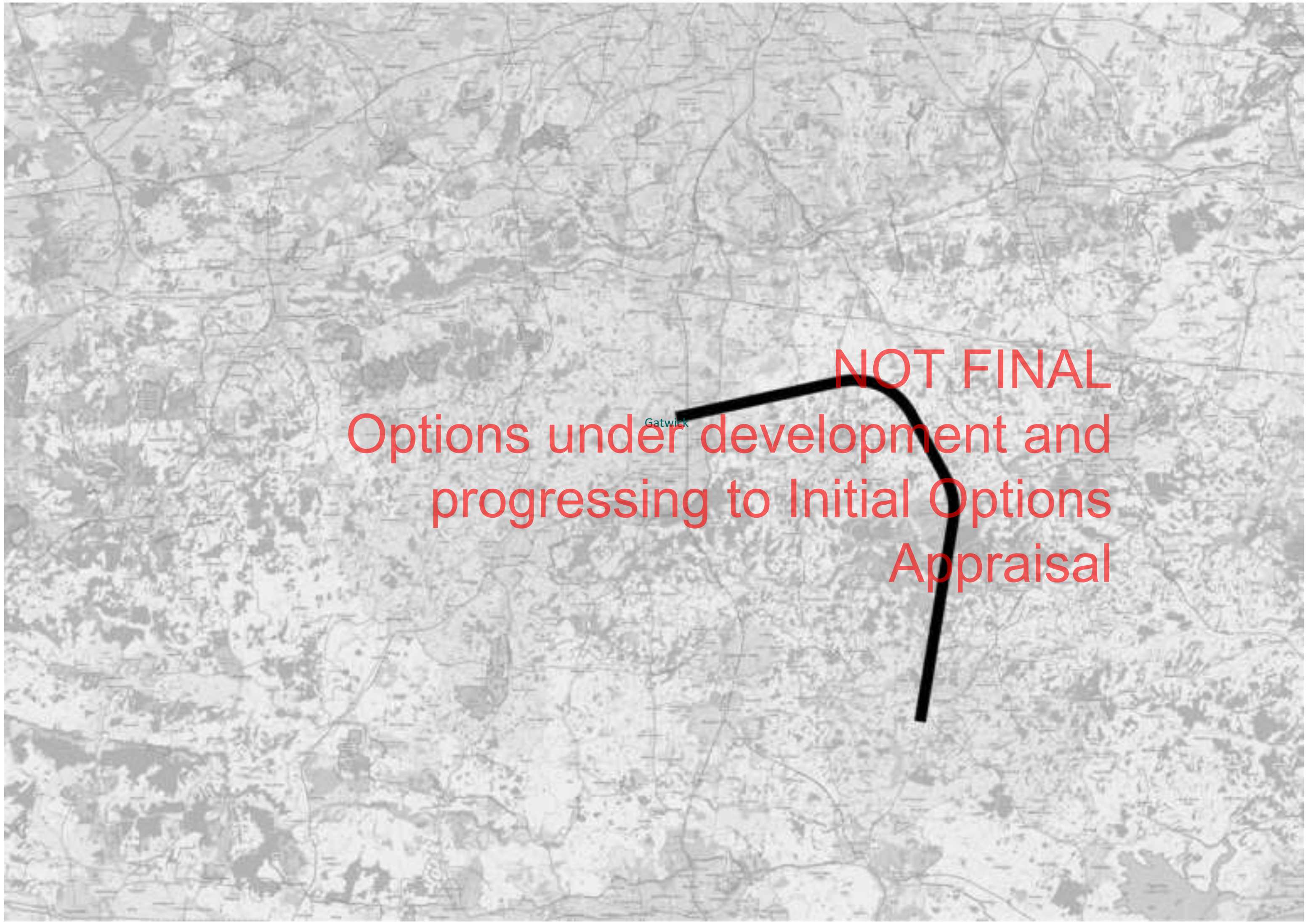


7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
WAC

Note: To be operated alongside an RMA



7000-0 (3^{o} descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT Gatwick

Arrivals
WAD

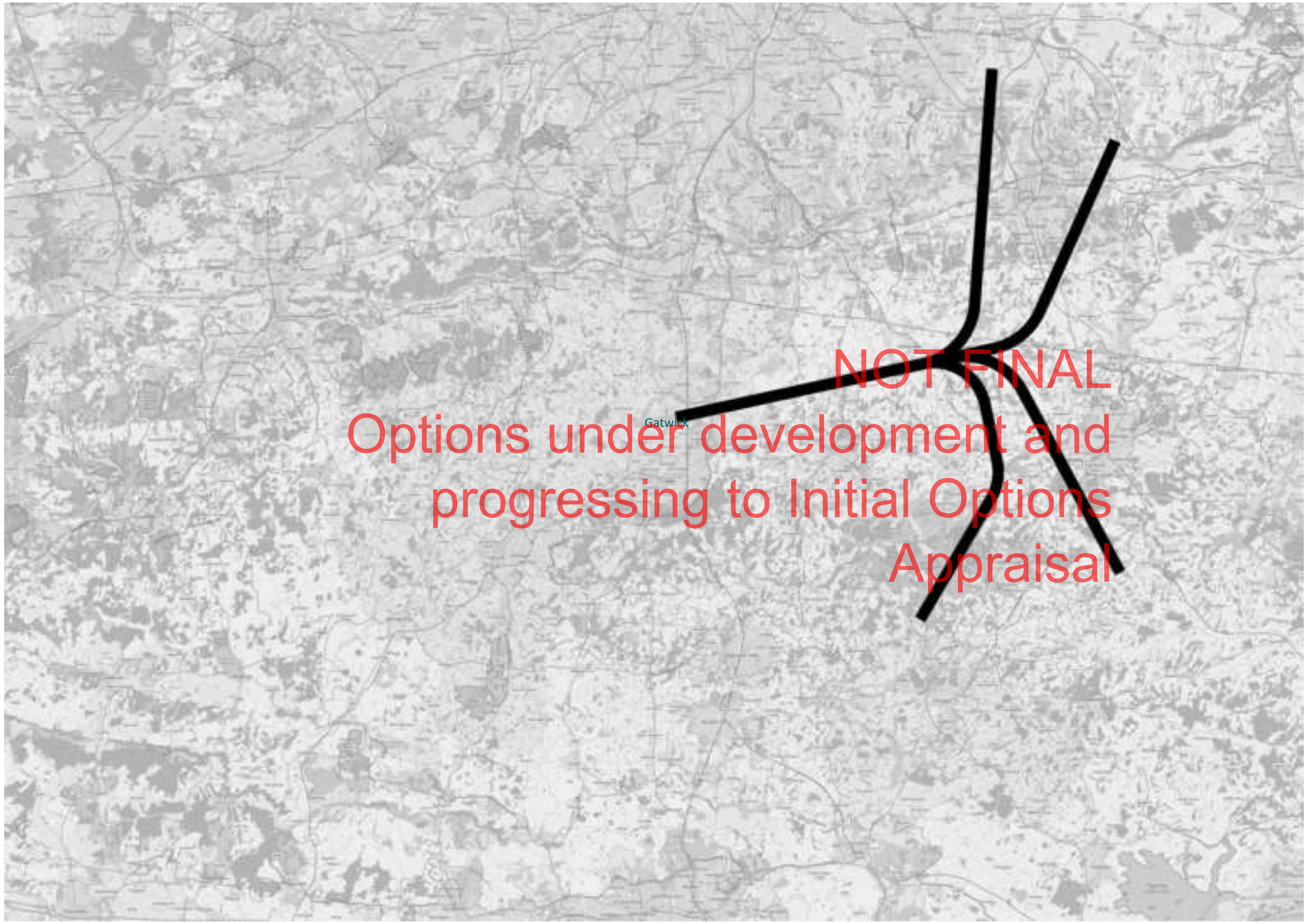
Note: To be operated alongside an RMA

For the purposes of the IOA, south route use split equally

PBN arrivals from the north on a tactical basis

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
WAE

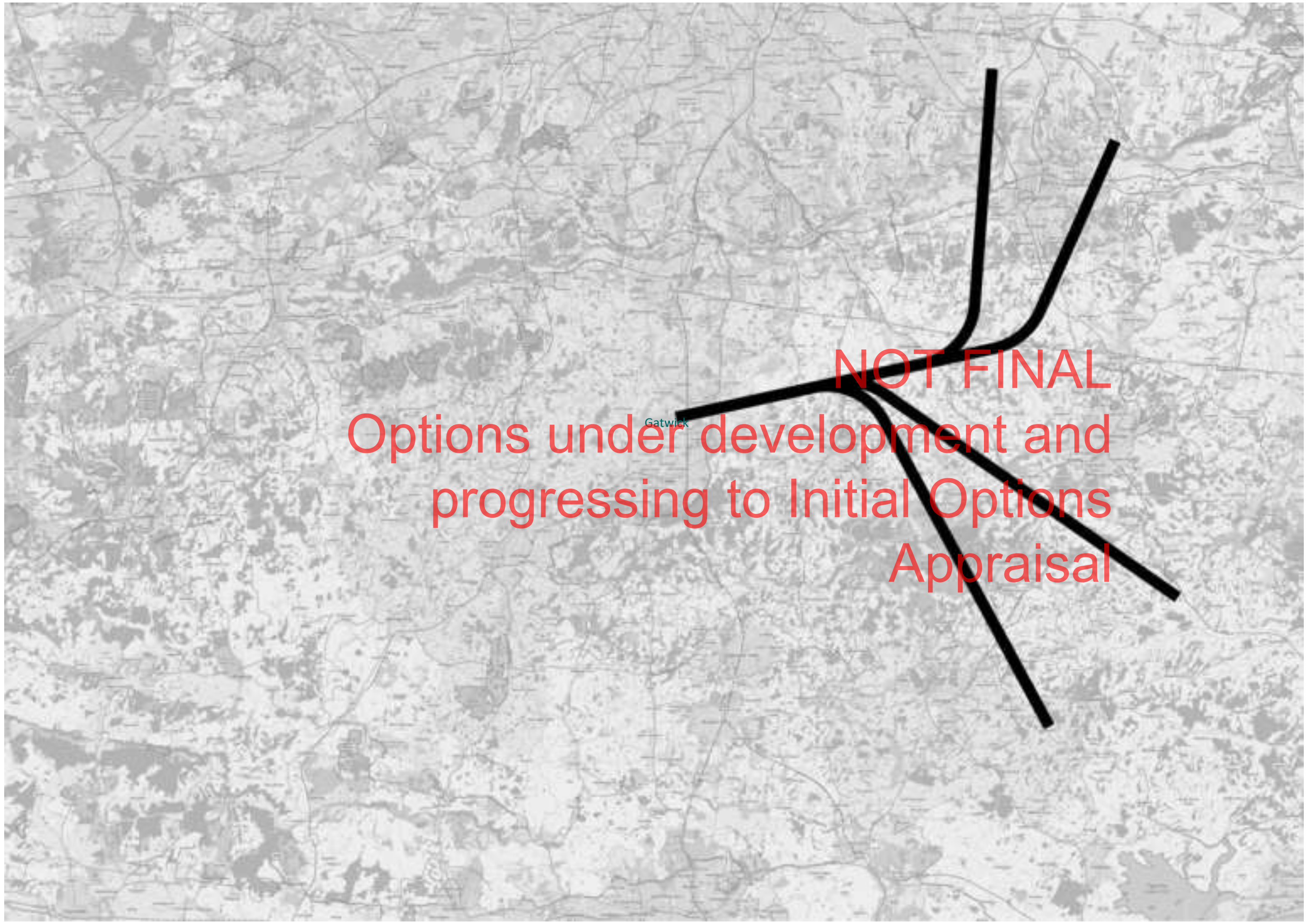
Note: To be operated alongside an RMA

For the purposes of the IOA, south route use split equally

PBN arrivals from the north on a tactical basis

7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

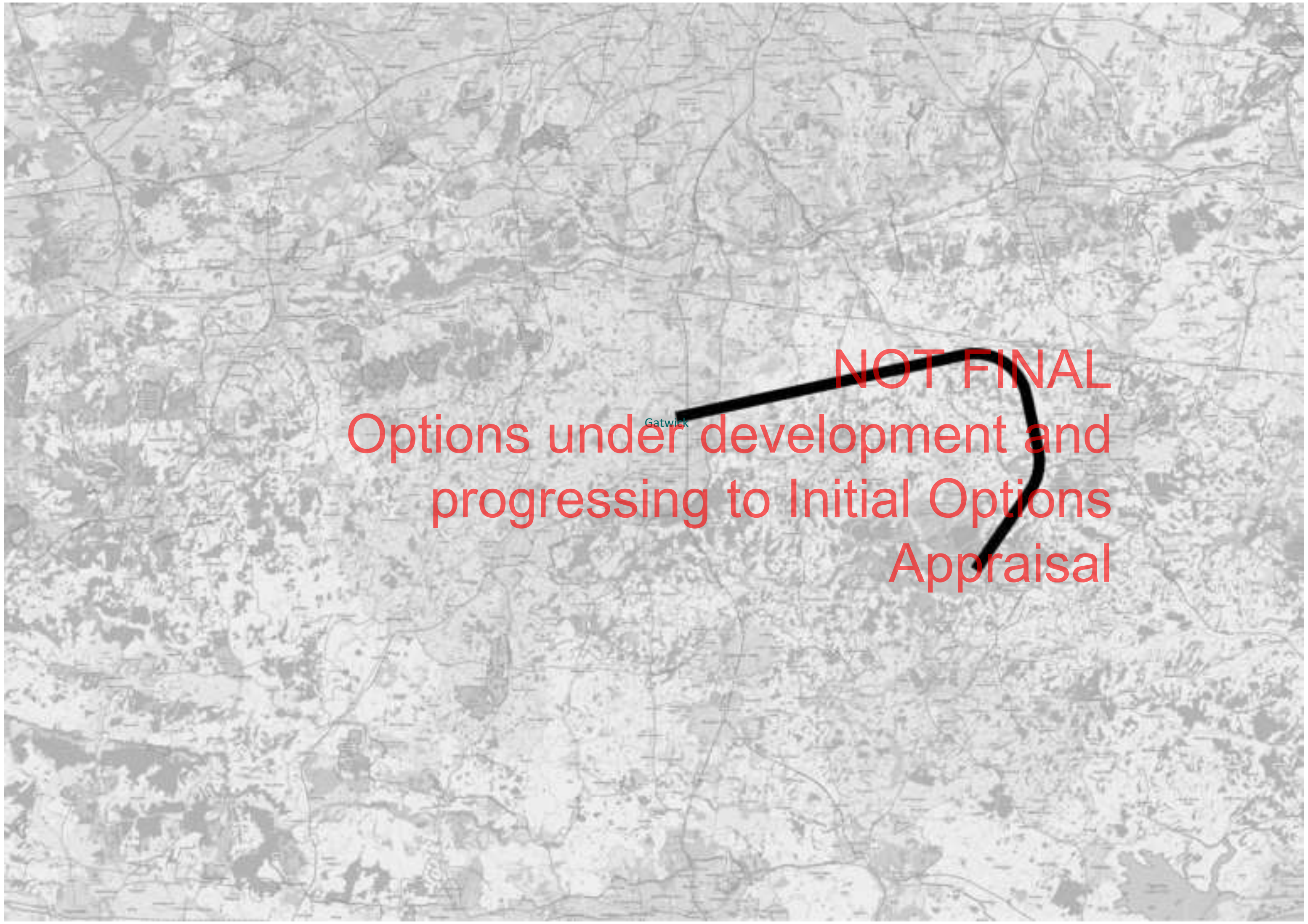


Arrivals
WAF

Note: To be operated alongside an RMA

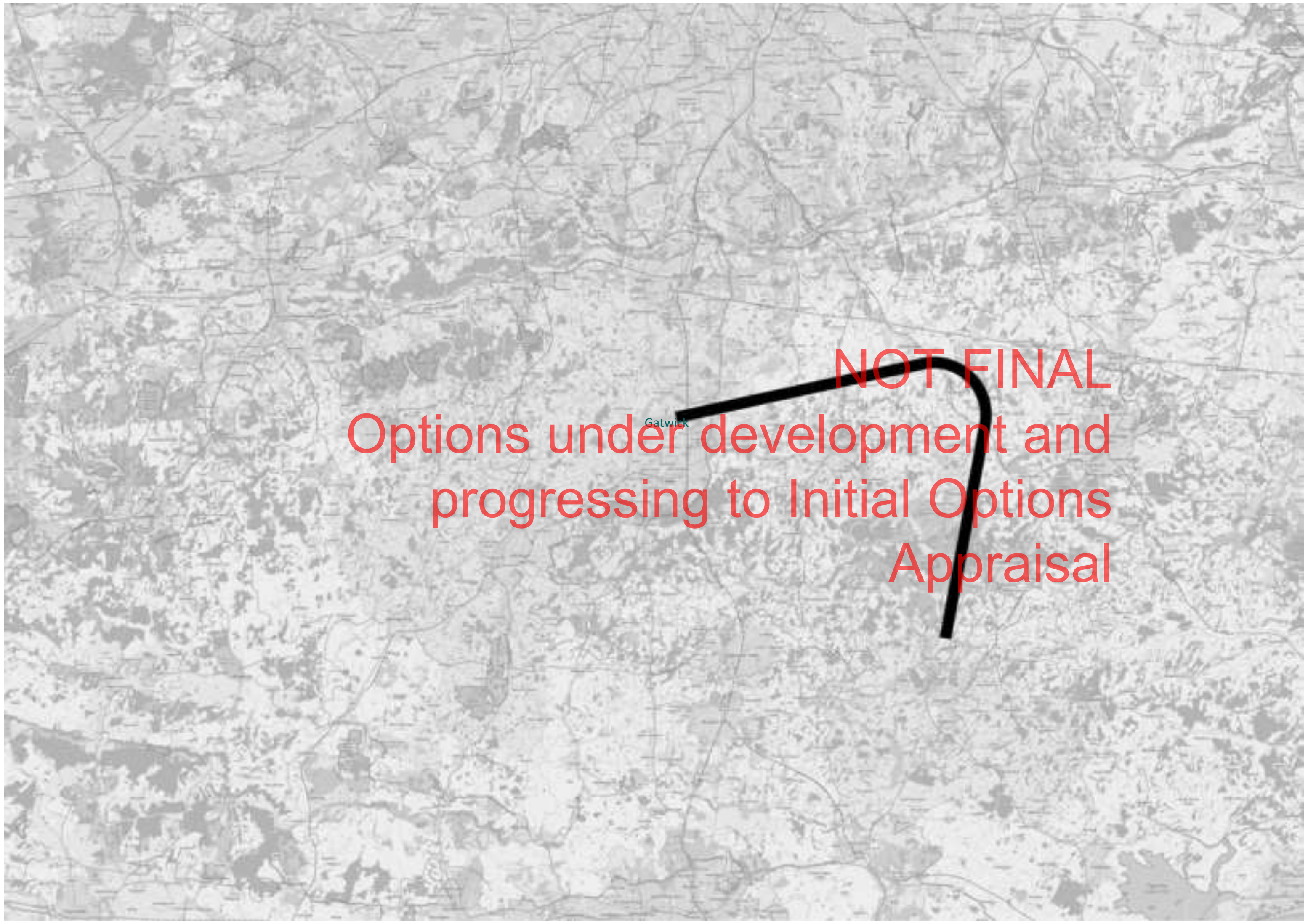
7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
WAH

Note: To be operated alongside an RMA



7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
WAI

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally

7000-0 (3º descent)

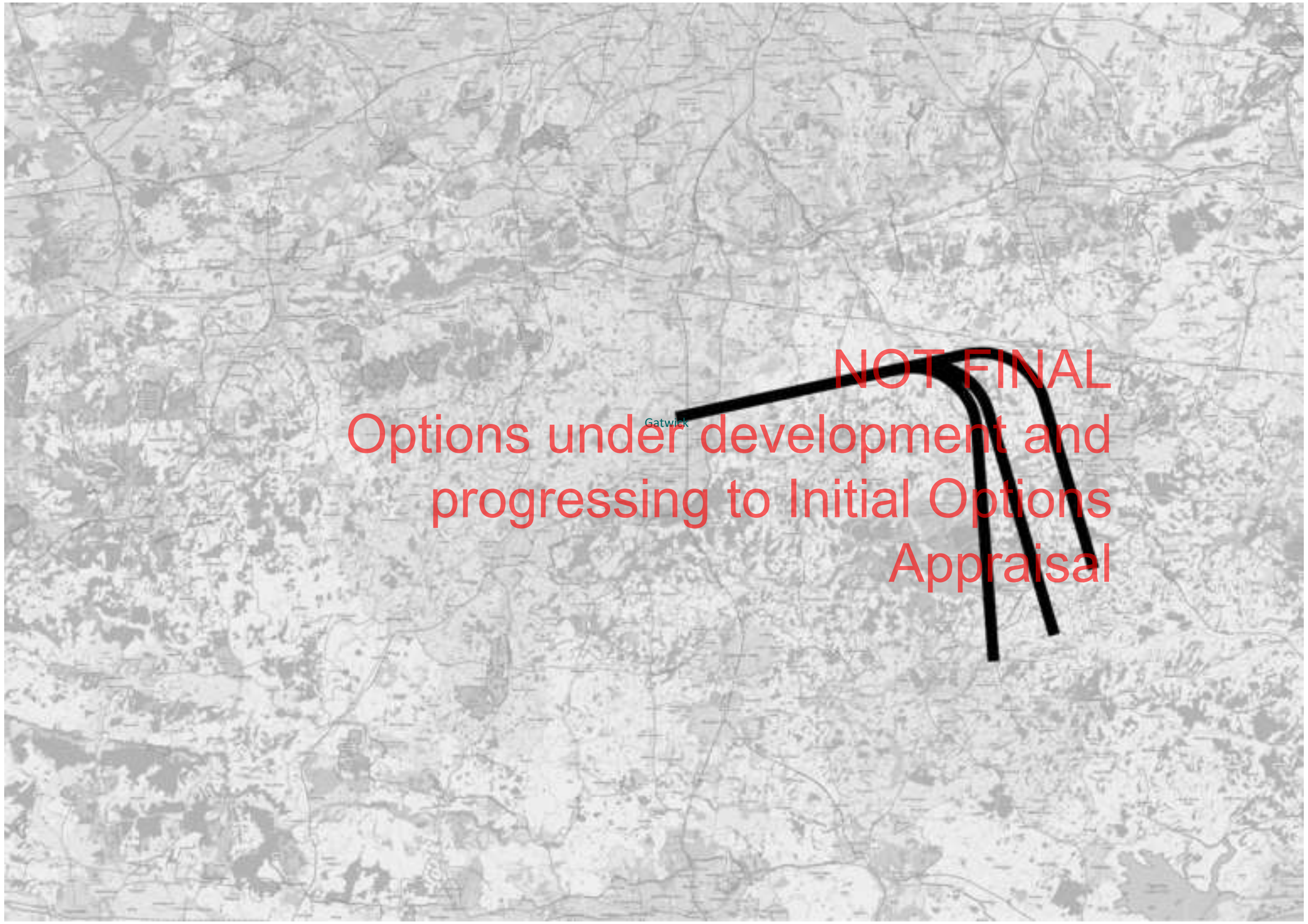
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

YOUR LONDON AIRPORT Gatwick

Arrivals
WAJ

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally



7000-0 (3º descent)

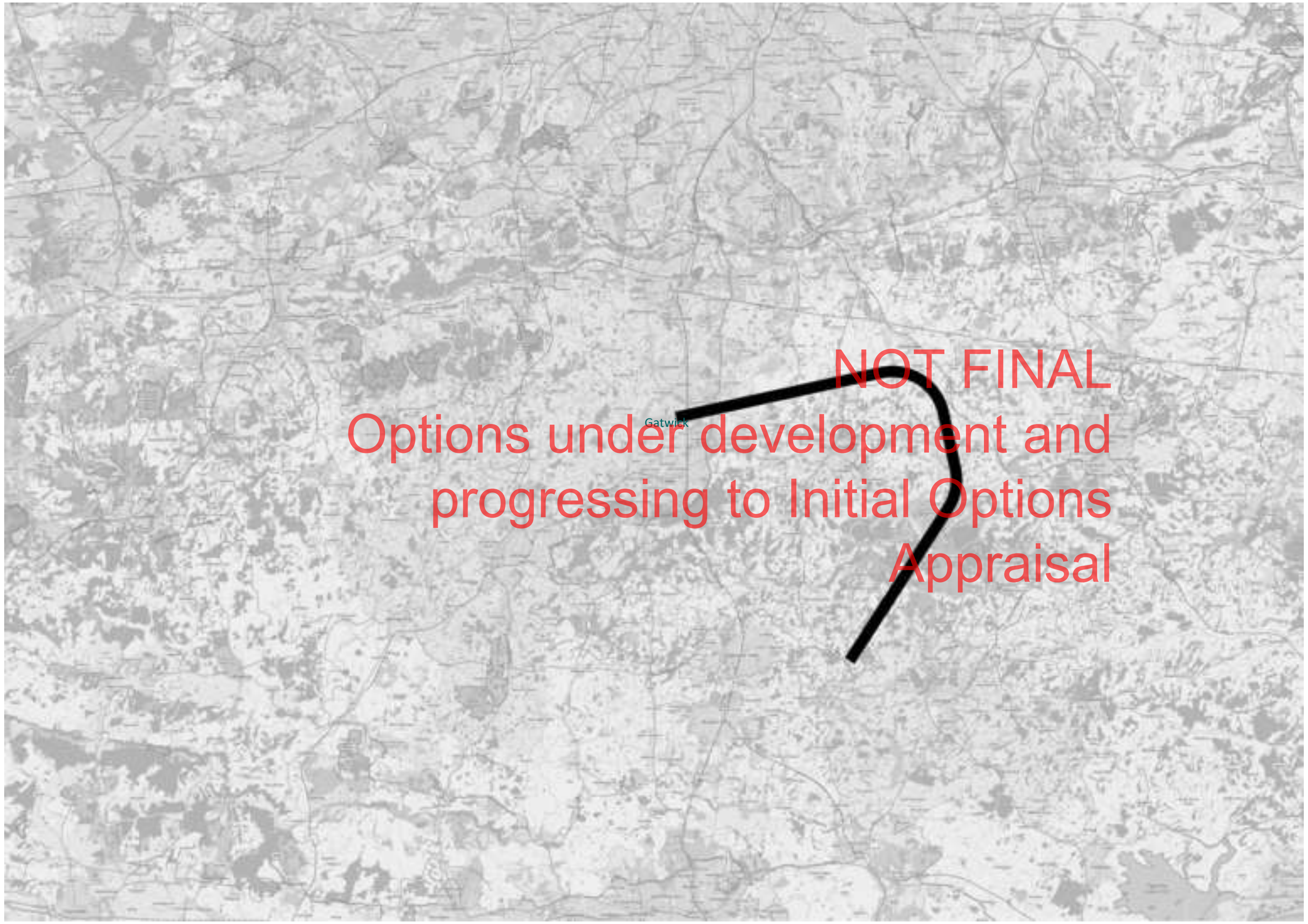
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
WAK

Note: To be operated alongside an RMA

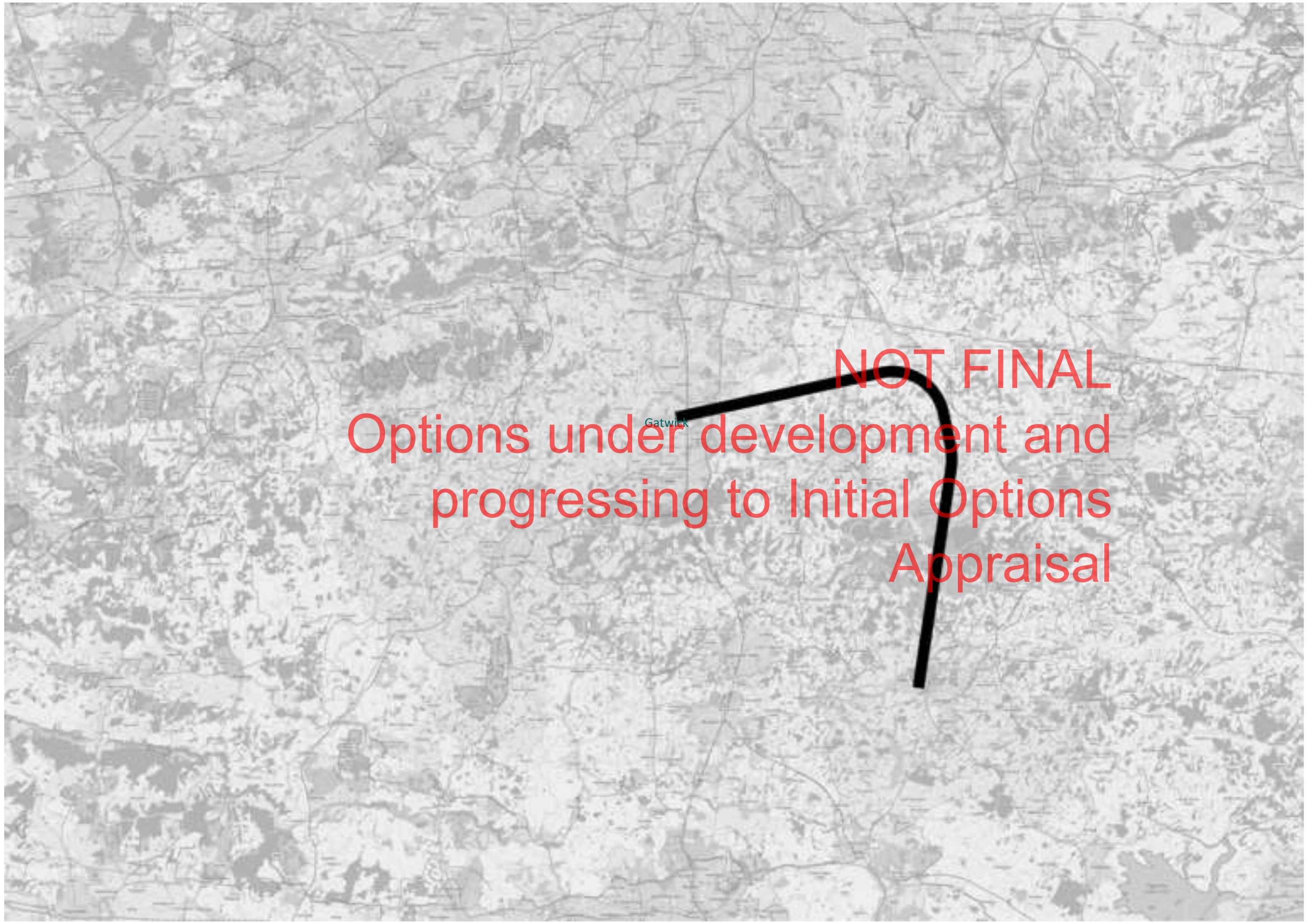
7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Arrivals
WAL

Note: To be operated alongside an RMA



7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

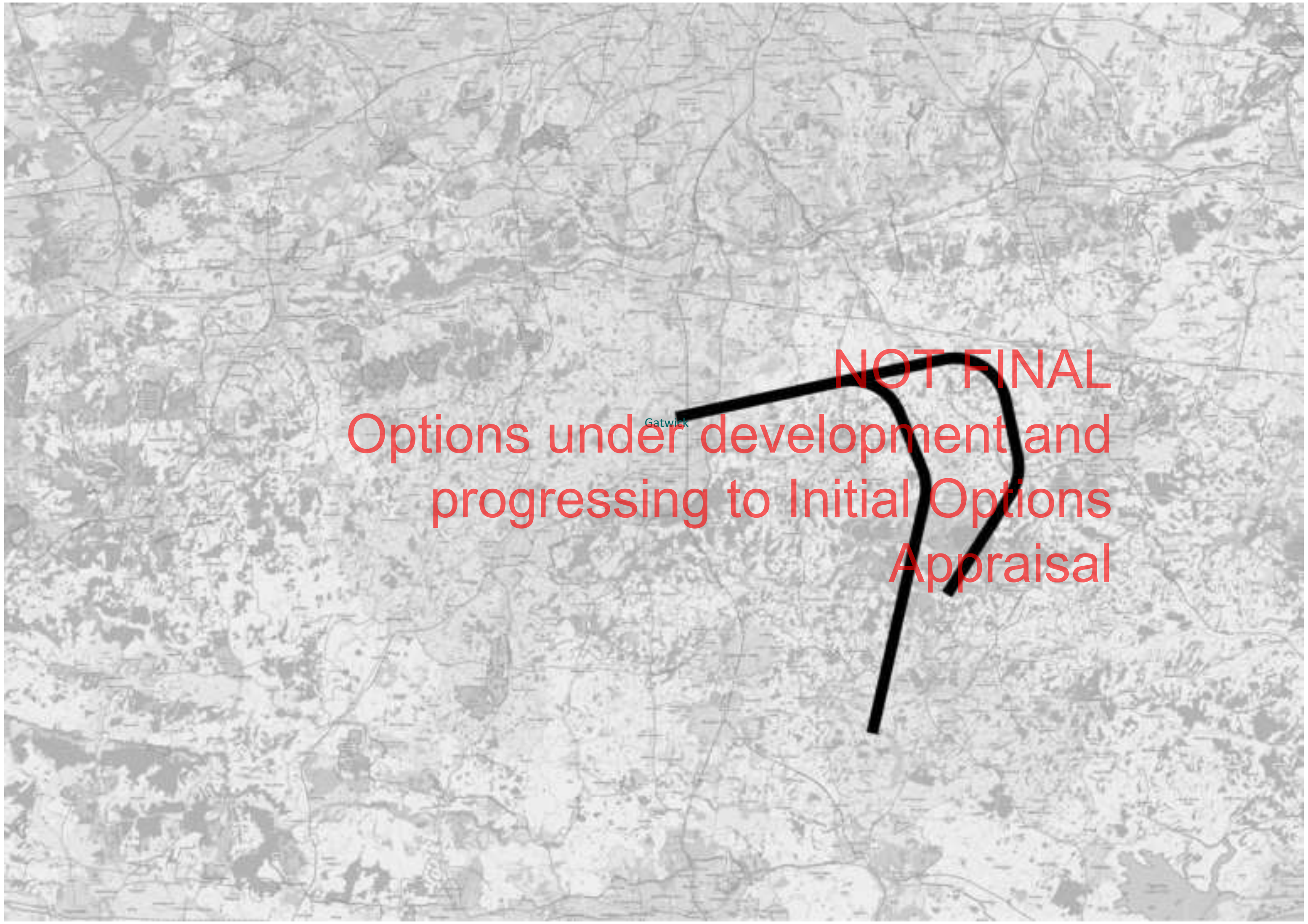
Arrivals
WAM

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally

7000-0 (3º descent)

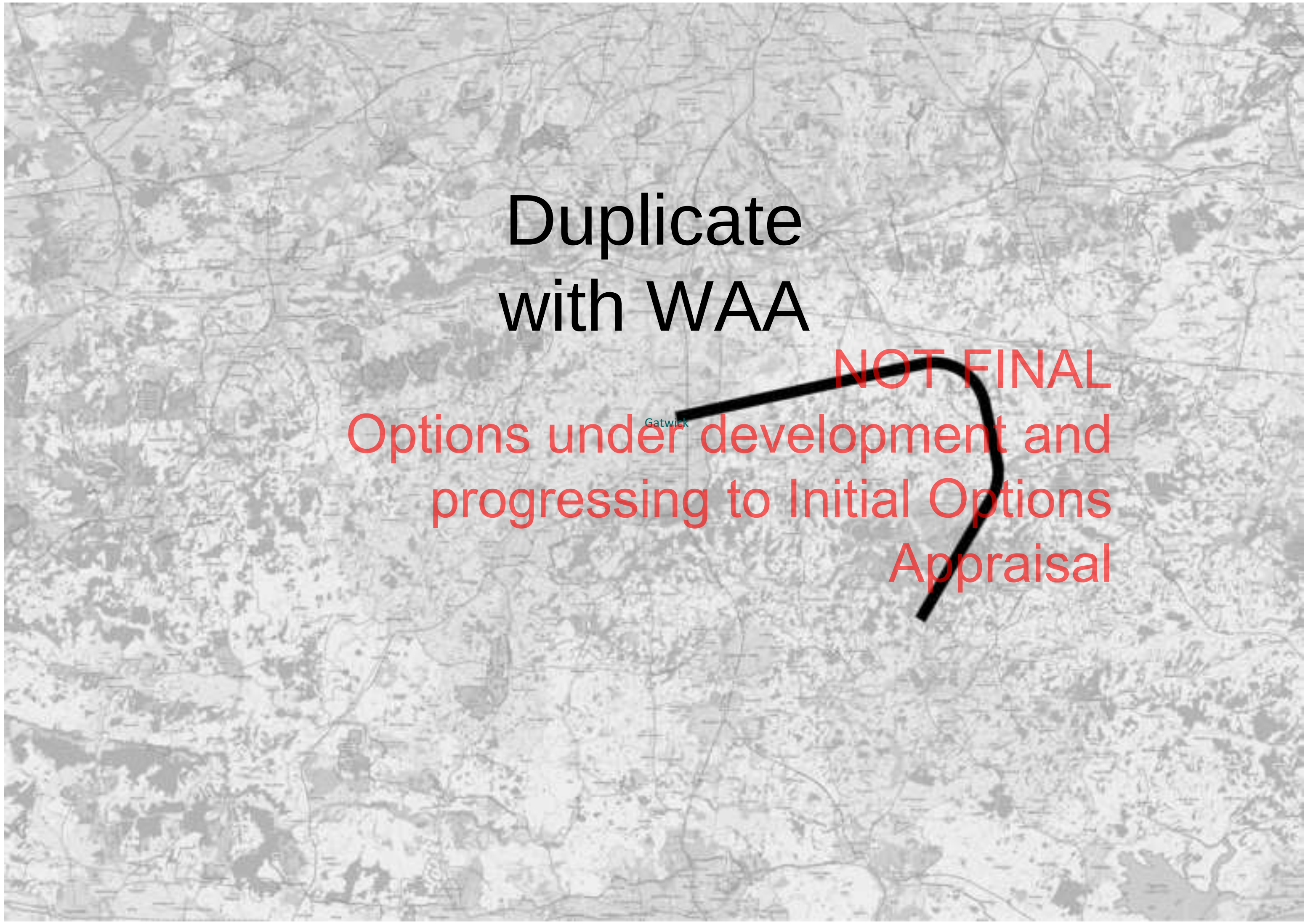
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



YOUR LONDON AIRPORT Gatwick

Arrivals
WAN

Note: To be operated alongside an RMA



7000-0 (3^o descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
WAO

Note: To be operated alongside an RMA

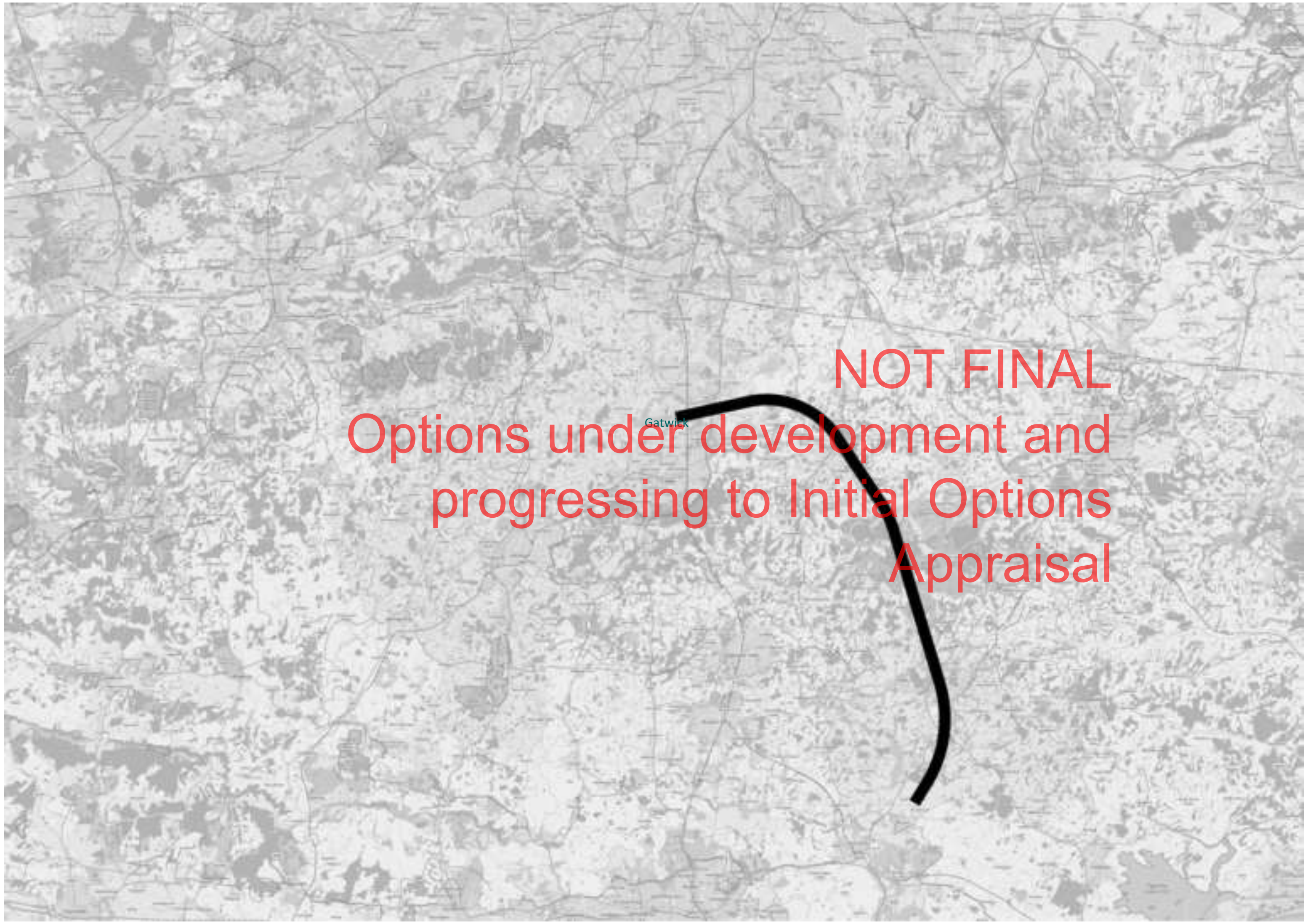
7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals WAP

Note: To be operated alongside an RNP-AR route

RNP-AR route



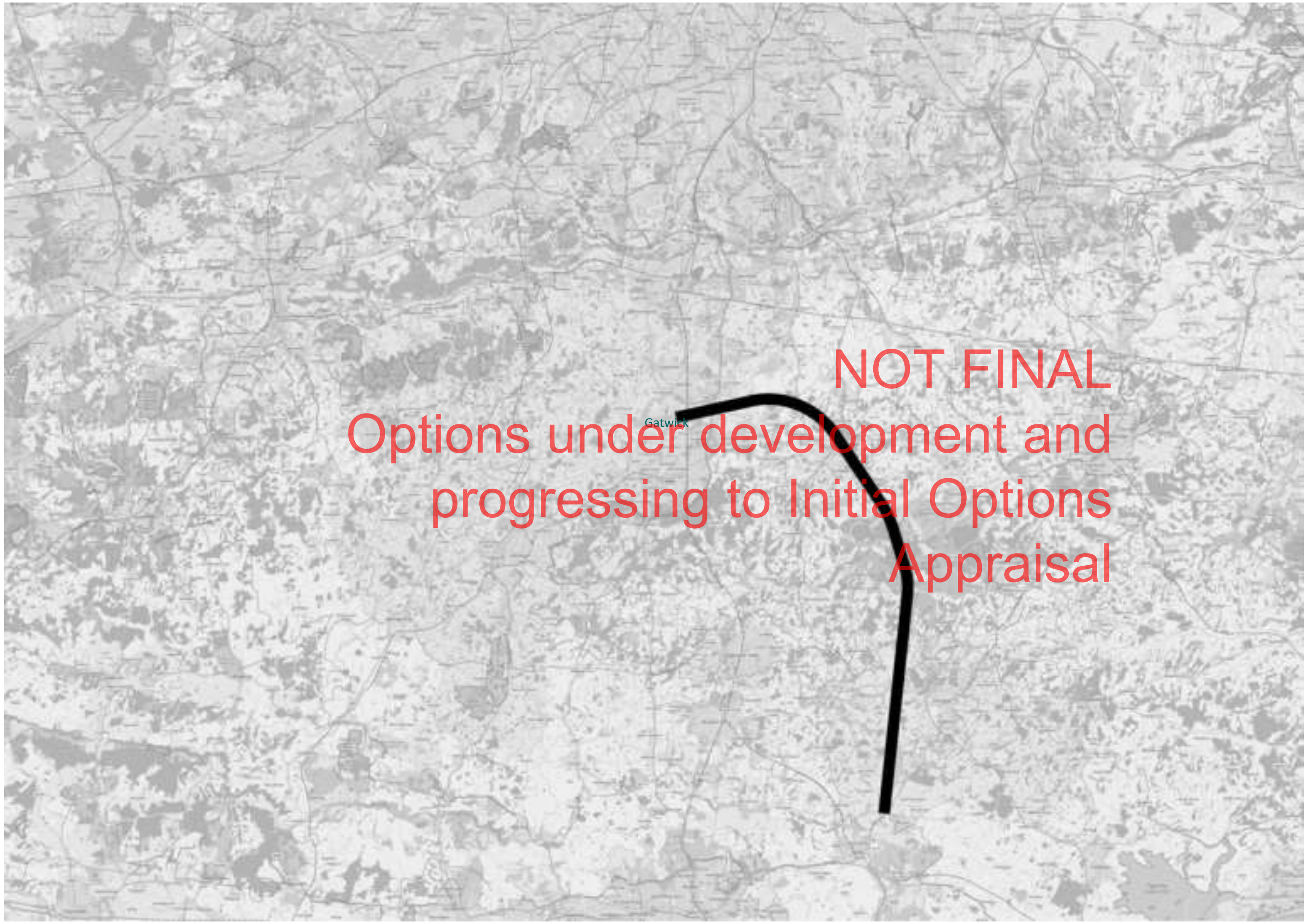
7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals
WAQ

Note: To be operated alongside an RMA

RNP-AR route



7000-0 (3º descent)

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Gatwick Airport FASI South Airspace Change Proposal Update for stakeholders on the methodology and outcomes of the Step 2B Initial Options Appraisal

Virtual Briefing Session

Friday 28th July, Monday 31st July, Wednesday 2nd August 2023

Version 1.0

LONDON GATWICK

POWERED BY VINCI AIRPORTS | GLOBAL INFRASTRUCTURE PARTNERS

Important Information

This presentation has been shared with Stakeholders following the Stakeholder Engagement workshops held on the 28th, 31st and 2nd August 2023.

Gatwick Airport has chosen to undertake engagement above and beyond the requirements of CAP1616 in the spirit of openness, transparency and continued dialogue between airport sponsor and stakeholders. The information within these documents is provided to facilitate discussions on the IOA methodology and should not be considered final. **We ask that stakeholders consider the preliminary nature of the information when reporting back to their organisations and care should be taken to ensure that all Airspace Change Proposal information is replicated fully, accurately and in context.** All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with CAP1616 guidance, safety requirements, our design principles, our appraisals and stakeholder engagement and consultation input.

If you have any questions or feedback regarding the Initial Options Appraisal (IOA) methodology or the presentation, please do get in touch via the LGWairspace.FASIS@gatwickairport.com email address. Please note that there will be opportunities as part of Stage 3 to discuss and feedback on the specific geographical areas or potential impact of the flight path options.

GLOSSARY

ACP	Airspace Change Proposal	A request (usually from an airport or air navigation service provider) for a permanent change to the design of UK airspace. An airspace change sponsor must follow a 7-stage process explained in the CAA's document CAP 1616 Airspace Design Guidance.
ANG	Air Navigation Guidance	Guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management.
AMS	Airspace Modernisation Strategy	A coordinated strategy and plan for the use of UK airspace for air navigation up to 2040, including for the modernisation of the use of such airspace, prepared and maintained by the CAA.
ATC	Air Traffic Control	Responsible for the safe separation of traffic in controlled airspace
CAA	Civil Aviation Authority	Independent aviation regulator and responsible for the adjudication of airspace change proposals
CAP1616	Civil Aviation Publication 1616	Guidance on the regulatory process for changing the notified airspace design and planned and permanent redistribution of air traffic, and on providing airspace information. www.caa.co.uk/cap1616
CCO / CDO	Continuous climb operations / Continuous descent ops	Allow arriving or departing aircraft to descend or climb continuously, to the greatest extent possible.
CLOO	Comprehensive List of Options	A list of viable options an airspace change sponsor develops as part of Stage 2 of the CAP1616 process. The list aims to address the statement of need and align with the Design Principles developed at Stage 1.

GLOSSARY

DfT	Department for Transport	Department for Transport. Co-sponsors with the CAA of the Airspace Modernisation Strategy
DP	Design Principle	Developed as part of Stage 1 of the airspace change process
DPE	Design Principle Evaluation	Undertaken as part of Step 2A of the CAP1616 process, the Design Principle Evaluation is a qualitative high level assessment which evaluates whether each option on the Comprehensive List of Options has either 'met', 'partially met' or 'not met' each Design Principle.
FASI-S	Future Airspace Strategy Implementation – South	The coordinated programme of airspace modernisation in southern England.
IOA	Initial Options Appraisal	Undertaken as part of Step 2B of the CAP1616 process, the Initial Options Appraisal involves a largely qualitative and some quantitative assessment of the impacts, both positive and negative, of the shortlisted options compared to the 'do nothing' pre-implementation baseline.
NATS	Formerly known as 'National Air Traffic Services	Provide air traffic services across the UK. NATS NERL (NATS (En Route) plc) are responsible for the upper airspace change (airspace network above 7000ft)
	Notional Flight Path	A path based on the basic principles of Instrument Flight Procedure (IFP) design that is used to flood sections of airspace. Notional flight paths are not airspace change options, but assessment of the paths provides a core set of environmental information that can be used when developing routes and options.
	Option	At this stage, an option is one complete system of either arrival or departure routes from the same runway end.

GLOSSARY

PBN	Performance Based Navigation	A concept that moves aviation away from the traditional use of aircraft navigating by ground-based beacons to a system more reliant on airborne technologies, utilising satellite systems and improving navigation accuracy and performance.
RMA	Radar Manoeuvring Area	An area of airspace used by ATC to vector aircraft. This allows ATC to sequence and safely separate arriving and departing aircraft.
	Vectoring	Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an Air Traffic Services surveillance system.

1. Welcome

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

Presenters for today's briefing

- Goran Jovanovic – Airspace Change Manager, Gatwick Airport Ltd
- Chris Barnes – Director, Trax International Limited
- Nichola Shaw – Consultant, Trax International Limited

The slides will be circulated following the meeting

Purpose of today's session

The purpose of today's session is to provide an overview of the Initial Options Appraisal methodology and to inform stakeholders of the outcomes of Stage 2.

The information within this document is provided to facilitate discussions on the Initial Options Appraisal methodology and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

1. Welcome & Introductions

- The slides will be circulated following the meeting along with a record of all questions and answers.
- We will pause regularly during the presentation to take feedback and questions.
- Please raise your virtual hand using the functionality in MS Teams if you would like to make a contribution, rather than putting questions in the chat.

Thank you.

1. Welcome & Introductions: Agenda

1. Welcome and introductions
2. Recap on the ACP timeline
3. Summary of the options development conducted to date
4. Overview of the Initial Options Appraisal methodology
5. Overview of the Initial Options Appraisal
6. Discussion, feedback, next steps and close

ACP Timeline

2. Overall ACP Timeline Update

The GAL FASI ACP is progressing through Stage 2 of the CAP1616 process, developing and assessing options for the airspace change.

The methodology addresses the requirements laid out in Stage 2 of CAP1616

Step 2A: Develop a Comprehensive List of Options and evaluate them against the Design Principles to narrow down to a **shortlist**.

Step 2B: Conduct an Initial Options Appraisal of the options on the **shortlist**.

The Initial Options Appraisal is the 1st of 3 phases of appraisal required to refine the options and progressively introduce more detail to the analysis of costs and benefits:

Initial Options Appraisal

Largely qualitative assessment of the shortlisted options to highlight the relative impacts, both positive and negative. The IOA is used to further narrow down the shortlist.

Stage 2: Develop & Assess

Full Options Appraisal

A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms, where possible. The FOA may be used to further narrow down the shortlist.

Stage 3: Consult

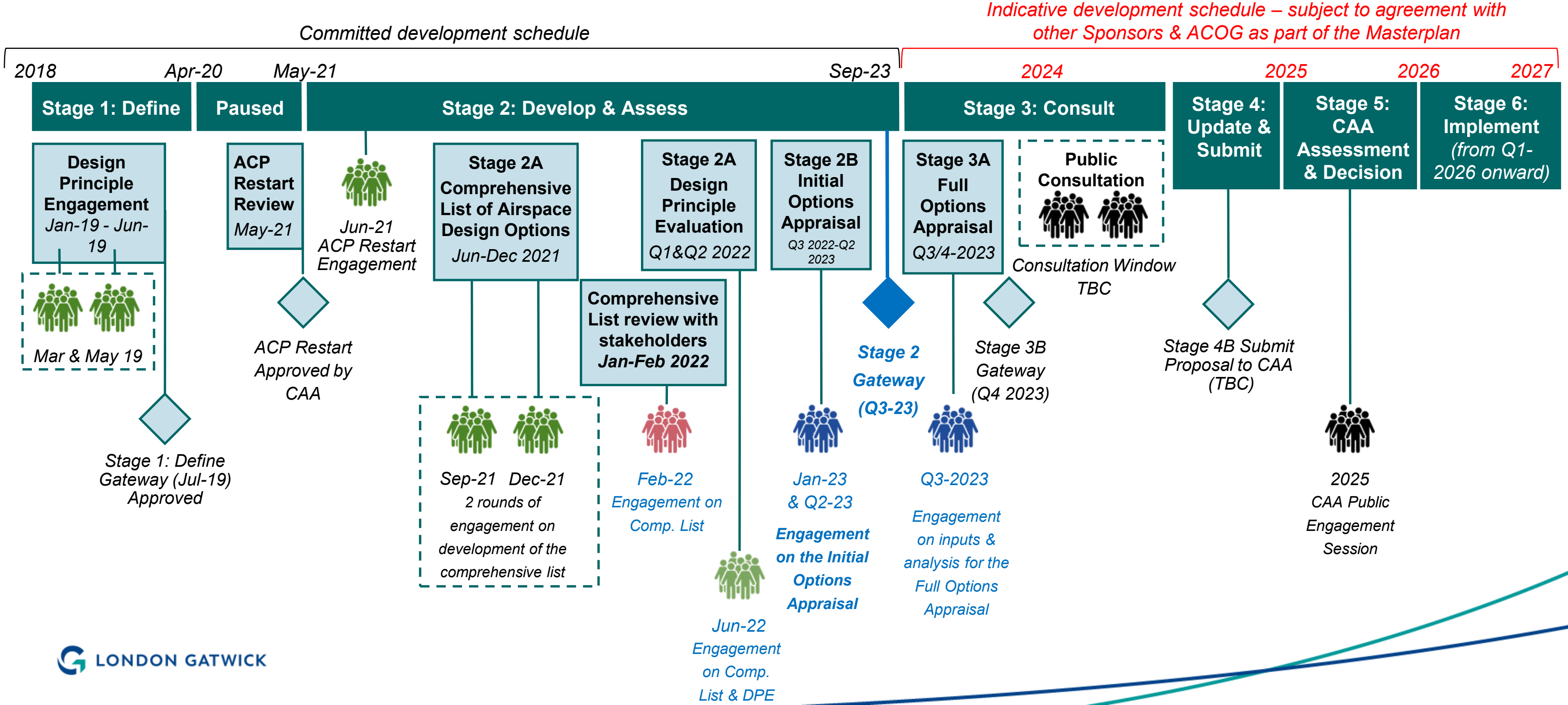
Final Options Appraisal

The full appraisal updated and refined based on the output of the Stage 3 formal consultation with stakeholders.

Stage 4: Update & Submit

2. Overall ACP Timeline Update

The following diagram shows the updated Stage 2A timeline within the overall ACP timeline:



2. Overall ACP Timeline Update

- We are due to submit our Stage 2 documentation to the CAA on the 1st September 2023.
- The documents will be published on the CAA's Airspace Change Portal shortly after submission.
- The purpose of these workshops is to provide an overview of the methodology of the Initial Options Appraisal and provide an update on outcomes of this assessment.
- Full details of the Initial Options Appraisal will be published as part of the submission.

The information within this presentation is provided to facilitate engagement and discussions about the ongoing development of the proposals and should not be considered final.

Link to Airspace Change Portal https://airspacechange.caa.co.uk/PublicProposalArea?pID=54

Summary of the options development conducted to date

Summary of Options Development

1	Develop an Airspace Design Database
2	Define Do Nothing Option
3	Build Comprehensive List of Options
4	Conduct the Design Principle Evaluation
5	Produce the Initial Options Appraisal
6	Set out Full Options Appraisal Method

The methodology for developing and assessing the Comprehensive List of Options (CLOO) is organised into six parts aligned to the CAP1616 requirements for developing & assessing options

The following slides recap the work undertaken to date to create, develop and assess the CLOO.

Summary of Options Development

1

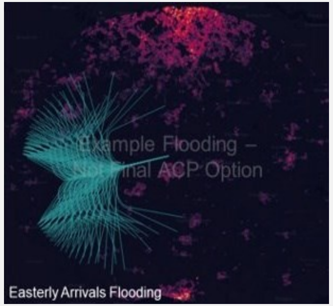
Develop an Airspace Design Database

The Airspace Design Database collates a core set of information needed to clearly demonstrate how each option has been identified and why the first list is considered sufficiently comprehensive.

Sections of Airspace & Notional Flight Paths

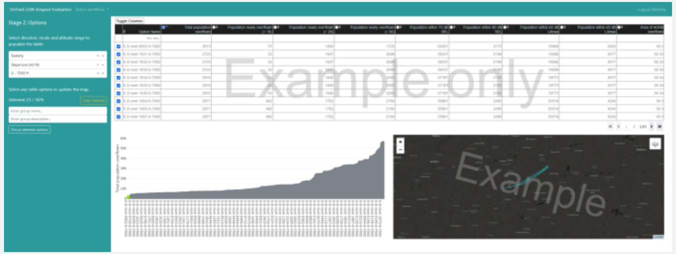
The database covered all geographical sections of airspace where a flight path may conceivably be positioned within the scope of the ACP.

We defined a broad range of notional flight paths that are technically possible within each section of airspace (an approach known as 'flooding').



Preliminary Assessment

A core set of information was produced through a preliminary assessment of the performance of each individual notional flight path using a variety of noise and overflight measurements.



Summary of Options Development

	Stakeholder Engagement	We engaged with Stakeholders in September 2021 and December 2021 on the methodology we intended to follow when developing Airspace Change Options and we provided details of the Airspace Design Database.
2	**Define the 'do nothing'**	We defined the 'do nothing' pre-implementation scenario. Full details of this will be included in the Stage 2A submission document which will be published on the CAA's Airspace Change Portal.
3	**Build Comprehensive List of Options (CLOO)**	The airspace design database gave us lots of data and information which allowed us to identify the comparatively higher performing notional paths however in order to develop airspace change options that meet our Design Principles, we needed to combine these paths in systems. A system was defined as 'a workable group of arrival or departure routes from the same runway end'. When developing the system options, we looked to the Design Principles and combined the aims of these with the outputs of the Airspace Design Database in order to develop the Comprehensive List of Options. At this stage, we separately considered departures and arrivals so that we could explore as many different options as possible.

Summary of Options Development

3

Build a Comprehensive List of Options

Stakeholder Engagement

As part of the process of developing the Initial Comprehensive List of Options, we developed 39 options based on the Design Principles and the outputs of the Airspace Design Database.

In February and March 2022 we held engagement workshops on the Comprehensive List of Options. As per the CAP1616 process, the same stakeholder representatives who were involved in Stage 1B, and in the previous rounds of Stage 2 engagement were invited to attend the workshops.

The purpose of the engagement was to test the Comprehensive List of Options to ensure it has been developed in line with the Design Principles. It's important to note that this engagement was not to seek feedback on the position of each individual flight path included in the options; that will happen later in the CAP1616 process.

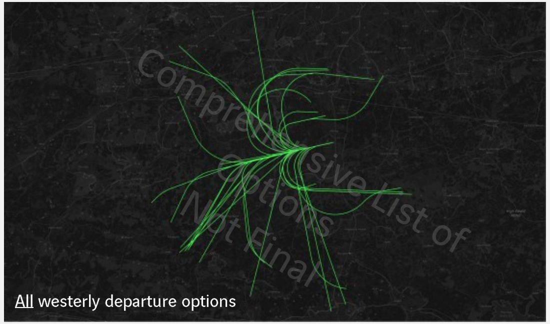
Following the engagement, all feedback was reviewed and where appropriate used to develop further options. The key themes arising from stakeholders' feedback that resulted in further options being developed were:

- Rural areas and Ambient Noise
- Westerly arrivals between 7nm and 10nm
- Arrival respite configurations with two routes
- Balance of total population overflown and newly overflown metrics

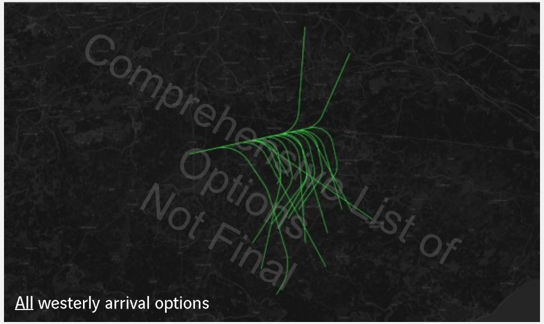
Summary of Options Development

3	Build a Comprehensive List of Options

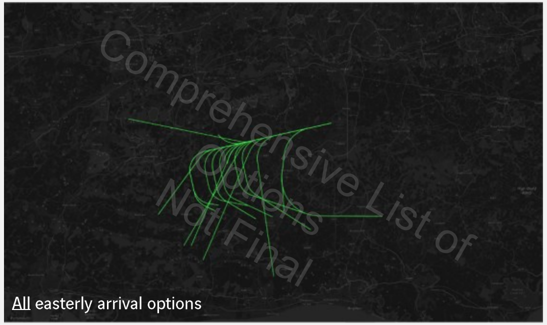
Following Stakeholder Engagement, the Comprehensive List comprised of 70 options.
(17 westerly departure options, 18 easterly departure options, 18 westerly arrival options and 17 easterly arrival options).



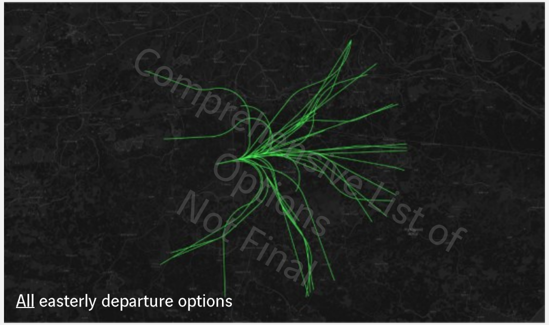
All westerly departure options



All westerly arrival options



All easterly arrival options



All easterly departure options

Summary of Options Development

3	**Build a Comprehensive List of Options**	As part of the Stakeholder Engagement we explained that our options have been developed in isolation to any other airport or airspace considerations and options will evolve as we progress through the process and more information becomes available about the potential impacts and the interdependencies with other proposals. The first opportunity to incorporate any information available was as part of the Design Principle Evaluation.
	Stakeholder Engagement	

Summary of Options Development

4

Conduct the Design Principle Evaluation

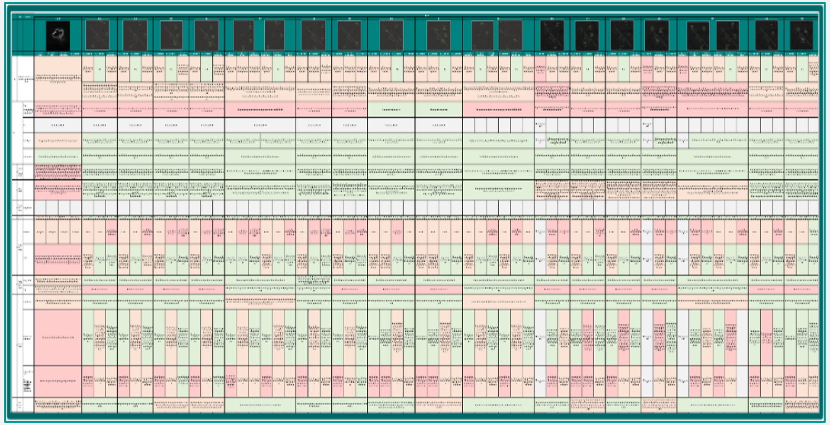
The Design Principle Evaluation (DPE) examines how well each option aligns with the Design Principles and shortlists the options to progress to the Initial Options Appraisal.

The DPE includes a high level assessment of each option which outlines whether the design principle is **'not met', 'partially met' or 'met'**.

The DPE is a relatively high-level, mainly qualitative exercise, but must clearly set out how each option has performed against each Design Principle and why options have continued or been paused.

The outcome of the DPE is a matrix of information about the performance of each option against each design principle.

This information can guide shortlisting options, or help inform the evolution of options before proceeding to the Initial Options Appraisal.



Example of detail of the Departure DPE
(Full details will be available in Stage 2 submission)

Summary of Options Development

4

Conduct the Design Principle Evaluation

Stakeholder Engagement

In January and February 2023 we held engagement workshops on the Design Principle Evaluation. These workshops provided an overview of the methodology of the DPE and the outcomes.

DPE Outcomes

PBN Arrivals: Stakeholders told us that their preference would be for all the arrival options to continue to the Initial Options Appraisal and be subject to further noise analysis before any are discontinued. GAL considered this feedback and included all PBN arrival options in the Initial Options Appraisal.

Radar Manoevering Area (RMA) Alongside the PBN options, a Radar Manoevering Area (RMA) or vectoring area option was taken forward for both Easterly and Westerly arrivals. Within the IOA we committed to assessing these in 4nm joining bands, e.g. joining at 8-12nm, 9-13nm, 10-14nm, 11-15nm and 12-16nm.

Baseline 'do nothing' The DPE showed that the options overall performed better than the easterly and westerly baseline scenarios for arrivals and departures. This was because the baseline scenarios do not meet the Government's AMS, nor do they address the statement of need or enable any environmental, controlled airspace or operational benefits. The baseline 'do nothing' scenarios were therefore discontinued however they will remain present throughout the ACP for baseline comparative purposes only.

Summary of Options Development

4

Conduct the Design Principle Evaluation

Stakeholder Engagement

DPE Outcomes
Departures

In the case of departures the feedback from NATS NERL, who are responsible for the airspace above 7000ft, identified that some routes within some options were not safely viable. Within the DPE matrix, any individual routes that were categorised as 'not viable' were discontinued.

The DPE also identified that most options in their current configurations would not be compatible with the network design and the broad flows of departure traffic above 7000ft. Therefore, for departures, an outcome of the DPE was that we evolved the configuration of the existing options so that they are more closely compatible with the network airspace design above 7000ft.

Broad departure flows within the network airspace

Summary of Options Development

4

Conduct the Design Principle Evaluation

Stakeholder Engagement

DPE Outcomes

Another outcome of the stakeholder engagement held in January and February 2023 was that Stakeholders requested detailed maps of the Options going into the Initial Options Appraisal.

At this stage (Stage 2), the purpose of the engagement is to understand if the options have been designed in alignment with the design principles and we are engaging with stakeholders about the development, evaluation and appraisal of the options to get to a shortlist to take through to Stage 3.

As part of this round of engagement, we will share images of the options, overlaid on maps and population information, as part of the information pack provided following the engagement sessions.

At Stage 3 of the process, the preferred option(s) following Full Options Appraisal will proceed to public consultation. At this stage we will publish detailed maps and noise contours alongside the outcomes of the Full Options Appraisal of the benefits and impacts of each option and there will be an opportunity to interrogate this information and feedback on the proposals.

Summary of Options Development

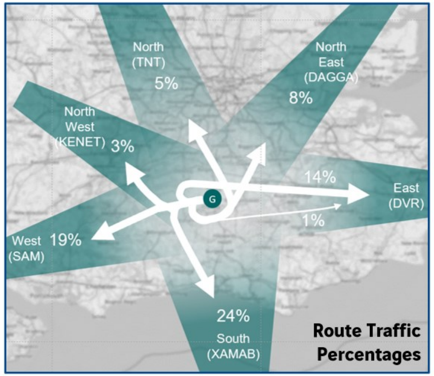
4

Conduct the Design Principle Evaluation

Stakeholder Engagement

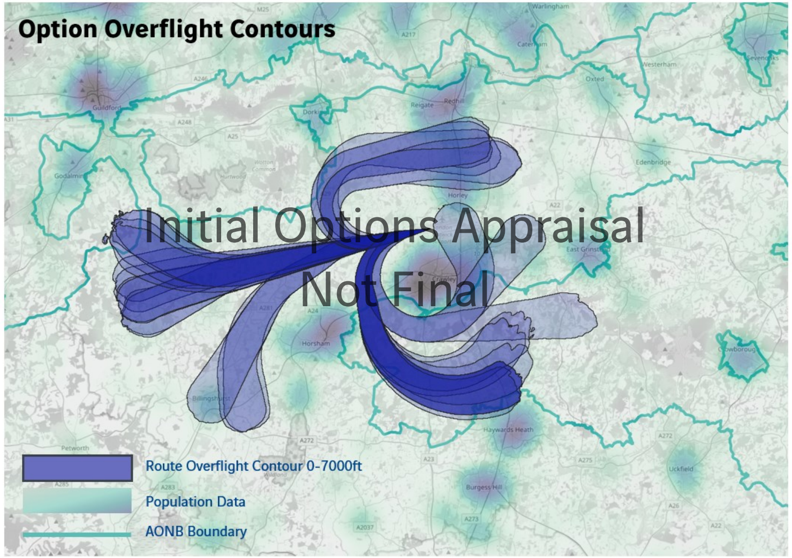
Example of map to be shared following these engagement sessions

Westerly System 5



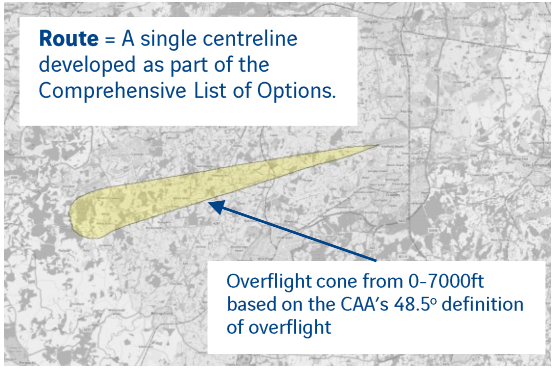
The options and any data shown in this document should not be considered final.

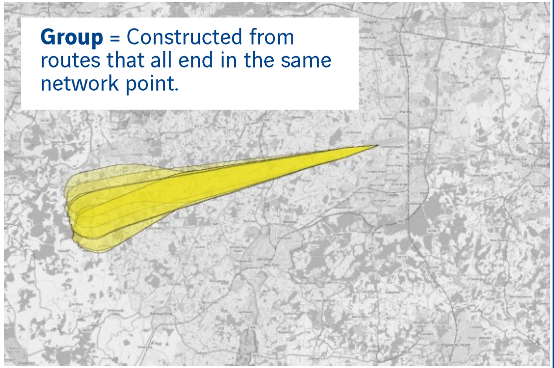
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

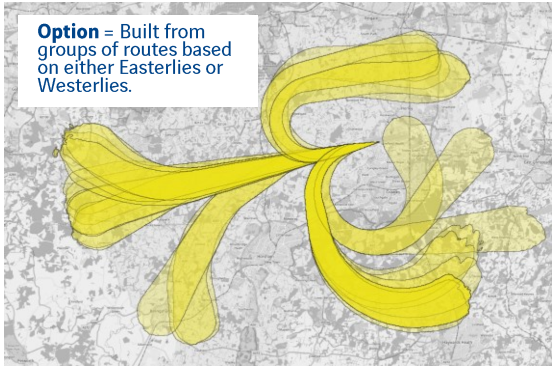


Departure Routes, Groups and Options

Assessed within the IOA







As the ACP progresses, the groups within the options will be refined until each option has a single route centreline which serves each network exit point. Development of the options to explore equitable distribution of noise, such as respite routes, will form part of Stage 3.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

Summary of the Options Development conducted to date

5

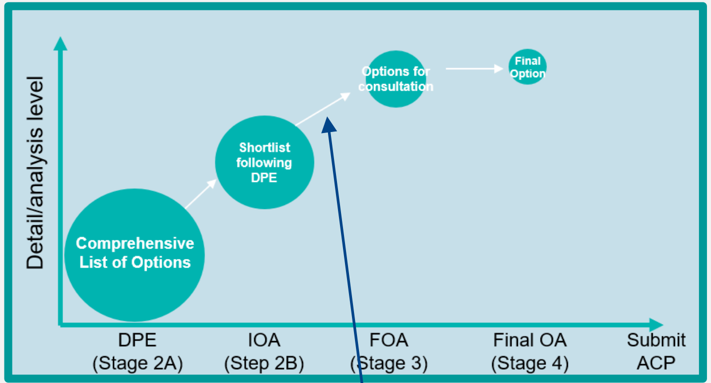
Initial Options Appraisal (IOA)

Where we are now

The Step 2B **Initial Options Appraisal (IOA)** is the first stage in a three-phase appraisal of airspace change options. It involves the mainly qualitative appraisal of the airspace change options that have proceeded from Step 2A (the DPE).

The Stage 3 **Full Options Appraisal (FOA)** is required to provide more rigorous evidence, typically through quantitative evaluation, of the options that will be taken to the public Stage 3 consultation compared against the 'do nothing' pre-implementation scenario.

Finally, the Stage 4 **Final Options Appraisal,** repeats the Full Options Appraisal on the final design which will be submitted for the ACP.



At the start of Stage 3, there will be a process for developing full east/west/arrivals/departure system options integrated with the network and neighbouring airports. This process will be documented as part of Stage 3 activities and it should be noted that not every combination of every system may be viable.

Summary of the Options Development conducted to date

5 **Initial Options Appraisal (IOA)**

Where we are now

As part of the Step 2B IOA document, change sponsors are required to:

- Provide an overview of the options taken to the Initial Options Appraisal
- Provide details of the criteria and methodology for assessing the options
- Describe the baseline 'do nothing' pre-implementation scenario
- Detail the benefits and impacts of each option tested against the baseline
- Draw qualitative conclusions on the outcome of the IOA and shortlist options

More details of the IOA are set out in later parts of this presentation.

6 **Set out Full Options Appraisal Method**

Finally, the last step in the methodology is to describe the methodology for producing a quantitative appraisal with monetised costs and benefits. This will form part of our engagement in Stage 3 of the Airspace Change Process.

Initial Options Appraisal Methodology Overview

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Format

The main Initial Options Appraisal (IOA) submission will be presented in three documents:

Step 2B Submission Document	The Step 2B submission document contains details of the options for appraisal, the IOA methodology, links to where the full IOA information can be found and details of the discontinuing methodology and conclusions
IOA Dashboards	The IOA dashboards provide an overview of the key IOA assessments and include maps and noise contour information about the options
(Annex A) Initial Options Appraisal	Annex A contains the Initial Options Appraisal in detailed table format. This includes all the qualitative and quantitative assessments that form part of the IOA.

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

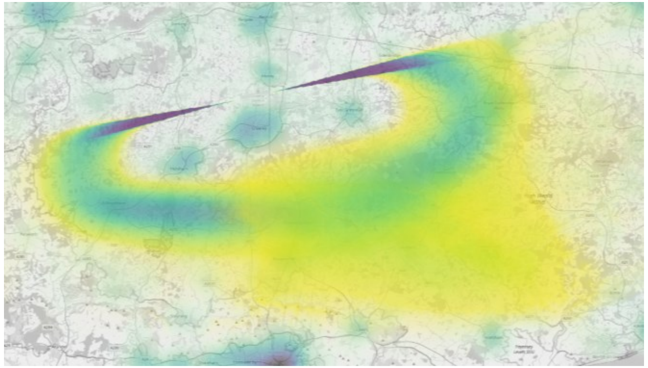
Initial Options Appraisal (IOA)

Assessment of Arrival Options

As noted throughout the arrival option development, it is anticipated that at the point of implementation, the technology required from network above 7000ft to facilitate single track PBN arrivals during periods of high traffic will not be available and therefore a 'hybrid' solution will be needed for arrivals.

This means we expect a Radar Manoeuvring Area (RMA) will be required alongside any PBN arrival options implemented. An RMA is an area of airspace where Air Traffic Control (ATC) vector aircraft. Vectoring typically creates dispersion across the airspace, as ATC provide tactical headings and altitudes to sequence arriving aircraft although in a hybrid solution, availability of PBN flight path(s) would result in some concentration along the PBN centrelines.

At this stage, the split of vectoring to PBN usage is not known; this will be informed by development simulations that will be undertaken as part of the detailed design work in Stage 3. **For the purposes of this IOA we have set about to determine the optimum PBN routes and we have separately assessed the RMA.**



Example of today's vectoring (Heatmap)

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

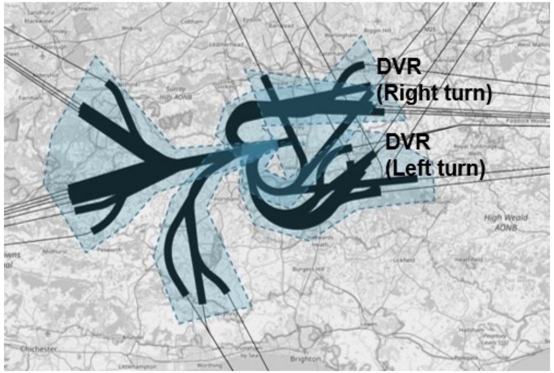
Initial Options Appraisal (IOA)

Assessment of Departure Options

Within the IOA, there are two types of assessment undertaken on the departure options.

1. The route assessments look at performance on a route by route basis. This is used for assessments such as track mileage and overflight.

2. The indicative system assessments look at how the option performs as a whole, taking into account the configuration of all routes. This is needed when considering categories such as safety, impacts to General Aviation and some noise metrics.



In the case of some options, there were different ways the traffic levels could be configured when assessing the options. For example on image opposite, DVR departures could turn left or right. As part of the IOA we have assessed both scenarios i.e. there is a scenario where majority of DVR departures turn left, and a scenario where the majority of DVR departures turn right.

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

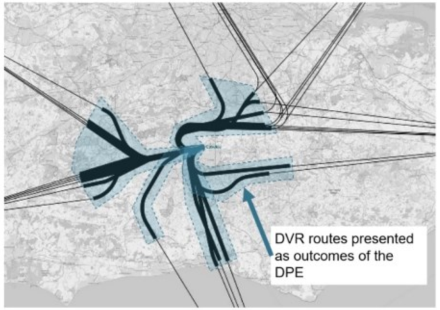
Initial Options Appraisal (IOA)

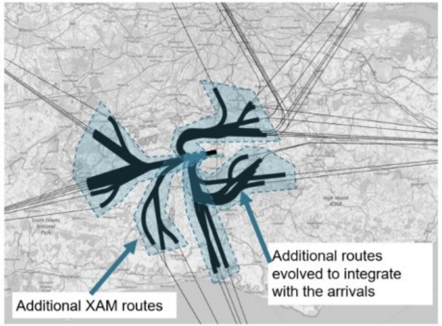
Evolution of some Departure routes

Although the arrival and departure options aren't being combined at this stage (this will happen ahead of the Full Options Appraisal in Stage 3), in preparation for the IOA, Gatwick looked at how the departure options might integrate with the arrival options in future.

It was found that some of the departure groups would have significant interactions with the arrivals which would be very difficult to overcome without compromising on continuous climb or descent performance. Gatwick therefore evolved some of the routes within these groups to better integrate with the arrivals in order to test these within the IOA.

Following feedback from NERL around how two routes to the same network exit point could be operated in future, we were also able to re-introduce some additional individual routes to XAM into some options. These routes are taken from the comprehensive list.





The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Assessment Criteria
The assessment criteria used for the IOA has been categorised based on the requirements of CAP1616 Appendix E as shown in the table opposite.

We have added an additional category called 'Interdependencies, conflicts and trade-offs' to satisfy the requirements to outline potential interdependencies with other FASI-S ACPs, and 'Airspace Modernisation Strategy' to satisfy the 7 confirmed indicators that the CAA will use to assess whether this Stage 2 submission accords with the AMS including iteration 2 of the Masterplan.

The baseline scenarios and all the options which proceeded to the IOA have been assessed using these categories.

Group	Impact
Communities	Noise impact on health and quality of life
Communities	Air Quality
Wider Society	Greenhouse Gas Impact
Wider Society	Capacity/Resilience
General Aviation	Access
General Aviation/ commercial airlines	Economic impact from increased effective capacity
General Aviation/ commercial airlines	Fuel Burn
Commercial airlines	Training costs
Commercial airlines	Other costs
Airport/ANSP	Infrastructure costs
Airport/ANSP	Operational costs
Airport/ANSP	Deployment costs
All	Safety
All	Performance against the vision and parameters/strategic objectives of the AMS
All	Interdependencies, conflicts and trade-offs

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

The IOA is a detailed appraisal of the benefits and/or impacts of an option compared against a 'do nothing' pre-implementation baseline scenario. The following slides provide an overview of the methodology applied.

The slides will be circulated following the meeting for review in slower time. Detailed methodology information will form part of the Step 2B submission document which will be published on the CAA's Airspace Change Portal.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Communities	Noise impact on health and quality of life

Although the IOA is intended to be a largely qualitative appraisal of the proposed designs, the Gatwick ACP IOA contains some quantitative noise data. The data is based on the noise impact metrics prescribed in CAP1616, specifically:

CAP1616 (B54) explains that

> *"When considering noise impacts, the CAA will weight the outcomes from 'primary' metrics over 'secondary' metrics. Primary metrics will be those that are used to quantify significant noise impacts, such as WebTAG outputs. Secondary metrics will be those that are not being used to determine significant impacts but which are still able to convey noise effects, such as N65 contours and LMax levels. While not a noise metric, overflight contours will be a secondary metric for the purposes of decision-making."*

To facilitate this noise modelling, using AEDT, has been undertaken having regard for CAP2091 requirements by replicating flight profiles and aircraft event outputs from the CAA's ANCON model. More information about the noise modelling will be included in the Stage 2B document.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Communities	Noise impact on health and quality of life

In this context, the primary noise metrics make reference to:

- **WebTAG** (https://www.gov.uk/guidance/transport-analysisguidance-webtag), which is the DfT's suite of guidance on how to assess the expected impacts of transport policy proposals and projects. The WebTAG workbooks can be used to monetise certain aspects of the noise impact however they require data from full airport system $L_{Aeq,16hr}$ (daytime noise) and $L_{Aeq,8hr}$ (night-time noise) contours we will generate in Stage 3.

- **L_{Aeq} Contours:** L_{Aeq} contours are generated from full airport system options, however it is also possible to generate indicative contours for a partial system (i.e. a group of either arrival or departure routes from one runway end). They look at average noise exposure across a 16hr day or 8hr night period. The daytime and nighttime Lowest Observable Adverse Effect Level (LOAEL) contour is defined in UK airspace policy and is used to evaluate the benefits and impacts of an airspace change. **The LOAEL is 'the point at which adverse effects begin to be seen on a community basis'** (source: ANG17).
- **Indicative partial LOAEL contours have been generated for the baseline and each option within the IOA.**

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

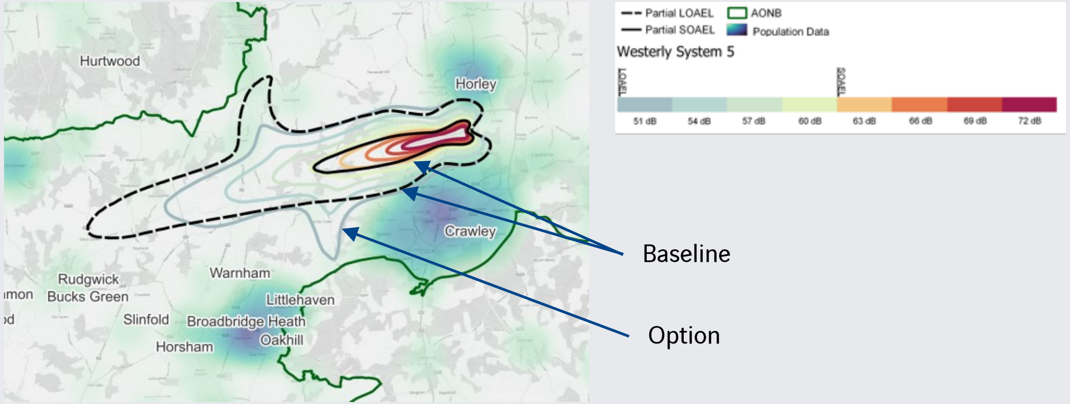
Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Communities	Noise impact on health and quality of life

Example of an Indicative Partial LAeq Contour compared to the baseline:



Data within IOA

Population within the indicative partial day / night LOAEL, changes in noise exposure (population with a greater than 3dB and greater than 1dB increase or decrease where noise exposure is above the LOAEL)

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Communities	Noise impact on health and quality of life

The secondary noise metrics refer to:

- **N65 / N60:** Noise Events above 65dB and 60 dB L_{Amax} (N65 and N60): N60 and N65 are noise metrics which respectively describe the number (N) of aircraft noise events above a noise level of 60dB L_{Amax} in the night-time period and 65dB L_{Amax} for the daytime period. These are event-based metrics, which can be used to better understand the number of noise events that occur and their location. **Indicative partial system N60 and N65 metrics have been generated for the baseline and each option within the IOA.**

- **Overflight Contours:** Overflight contours are generated using the CAA's 48.5 degree definition of overflight as outline in CAP1498, this means 'an aircraft in flight passing an observer at an elevation angle of 48.5˚ from the ground at an altitude below 7000ft'. Although overflight contours are not considered a noise metric, they do enable calculation of the number of times a location may be considered to be overflown. **Overflight metrics between 0-7000ft have been generated for the baseline and each route within each option within the IOA.**

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

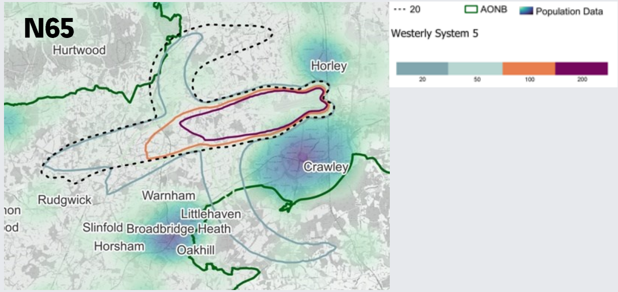
Initial Options Appraisal Methodology Overview

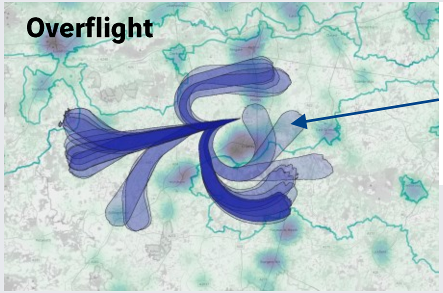
5

Initial Options Appraisal (IOA)

Group	Impact
Communities	Noise impact on health and quality of life

Example indicative partial N65 contour and example overflight contour:





Overflight cone from 0-7000ft based on the CAA's 48.5º definition of overflight

Data (N65/N60)

Population within the indicative partial N65 / N60 contours. Schools, hospitals and places of worship within N60/N65 contours.

Data (Overflight)

Population within route overflight contour from 0-7000ft. Population newly overflown compared to the do nothing baseline between 0-7000ft. Schools, hospitals and places of worship overflown between 0-7000ft.

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

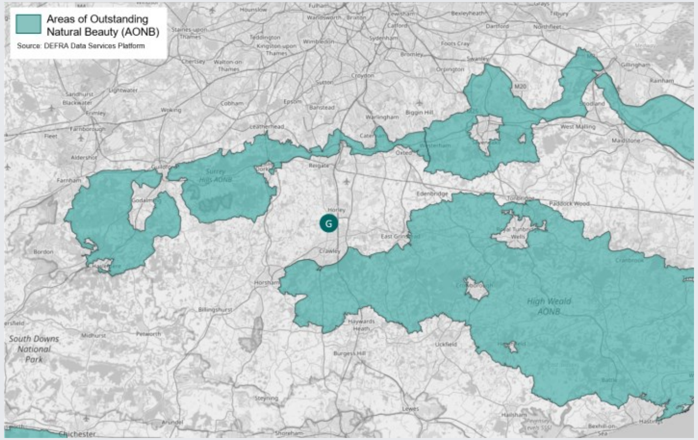
Initial Options Appraisal Methodology Overview

5 | **Initial Options Appraisal (IOA)**

Group	Impact
Communities	**Tranquillity**

CAP1616 references Areas Of Natural Beauty (AONB) and National Parks with respect to impacts upon tranquility. For the IOA the overall risk of impact on tranquility of each option has been assessed by considering the number of sites and total areas of AONBs and National Parks overflown with respect to N65 and overflight metrics.

Stakeholders have made us aware of the ongoing consultation on the Surrey AONB boundary. At the point of undertaking the analysis a revised boundary has not been agreed however we will continue to monitor the outcomes of the consultation, expected in early 2024, and we will incorporate any applicable information into the Stage 3 Full Options Appraisal.



All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Communities	**Biodiversity**

CAA guidance states that “In general, airspace change proposals are unlikely to have an impact upon biodiversity because they do not involve ground-based infrastructure. As such they are unlikely to have a direct impact that would engage the Birds or Habitats legislation”.

Though there is limited research available on the effects of aircraft noise on wildlife, there is some evidence that disturbance effects associated with aircraft can occur during take-off and landing where aircraft are below around 500m (~1640ft). [Drewitt, A. (1999) Disturbance effects of aircraft on birds. English Nature Birds Network Information Note].

Data has been generated for the baseline and route overflight contours from 0-1640ft which considers the number and area of RAMSAR sites, Sites of Special Scientific Interest (SSSIs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) overflown.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Communities	**Air Quality**

CAP1616 requires sponsors to assess local air quality impacts if there is likely to a change in aviation emissions (by volume or location) below 1,000 feet, and the location of the emissions is within or adjacent to an identified AQMA. **For the IOA, a qualitative Air Quality screening assessment was undertaken** to identify whether both of the conditions above are met for any option.

Group	Impact
Wider Society / Commercial Airlines	**Greenhouse Gas Impact / Fuel Burn**

As emissions of greenhouse gases arise from the combustion of aviation fuel and fuel burn is linked to track mileage, for the IOA, where possible, we have estimated the differences in track miles between the baseline and each route. For respite arrival options, we have calculated the average track mileage.

At this stage, **the IOA contains indicative quantified data in terms of track mileage based on all routes joined to a common network entry/exit point** informed by discussions with NERL about the airspace above 7000ft and a **qualitative statement around potential benefits/impacts to track mileage, fuel burn, and emissions.**

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Wider Society	**Capacity/Resilience**
A qualitative assessment of benefits/impacts to capacity and resilience has been undertaken.	
General Aviation	**Access**
The General Aviation (GA) assessment has been split into two areas of assessment: 1. Is the option is expected to require any additional Controlled Airspace (CAS) compared to the baseline? 2. Does the option offer any potential benefits and/or impacts to GA access. **The IOA provides a qualitative assessment based on the indicative system options which was undertaken by GA and Airspace SMEs.** At Stage 3, full airport system options will be developed and at this stage CAS will be quantified.	
General Aviation/ commercial airlines	**Economic impact from increased effective capacity**
Commercial Airlines: A qualitative assessment informed by the capacity / resilience assessment. General Aviation: A qualitative assessment informed by the GA Access assessment.	

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Group	Impact
Commercial airlines	Training costs
A qualitative assessment to identify potential costs associated with the re-equipage of fleets (if applicable) and/or the associated licensing and regulatory approval costs.	
Commercial airlines	Other costs
A qualitative assessment of whether the option could result in any other costs for commercial airlines.	
Airport/ANSP	Infrastructure costs
Airport/ANSP	Operational costs
Airport/ANSP	Deployment costs
A qualitative assessment of whether the option could result in any infrastructure/operational/deployment costs for the Airport / ANSP.	

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5 **Initial Options Appraisal (IOA)**

Group	Impact
All	Safety
A qualitative safety assessment to identify if new or revised safety assurances may be needed and whether an acceptable safety argument is envisaged to be achievable. It has been split into two areas of assessment: 1. Route safety performance, such as understanding whether the route is likely to meet Instrument Flight Procedure (IFP) design requirements. 2. Indicative system option performance to understand if there are any fundamental safety concerns which may require revised safety assurances.	
All	Interdependencies, conflicts and trade-offs
The IOA includes an interdependency assessment on a route basis based on other airport's Stage 2 options (where available) and where not available, we have used information in the ACOG Masterplan Issue 2. The assessment has also been informed by NERL and the plans for the network airspace above 7000ft.	
All	Performance against the vision and parameters/strategic objectives of the AMS
A qualitative assessment of the overall options performance against the four objectives of the Airspace Modernisation Strategy (AMS) CAP1711; Safety, Integration, Simplification, Environment	

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Initial Options Appraisal Methodology Overview

5

Initial Options Appraisal (IOA)

Comparison against the baseline

Each assessment compares the option against the 'do nothing' pre-implementation baseline.

Colour code within IOA	Colour meaning – Qualitative Assessments	Colour meaning - Quantitative Assessments
	Option is expected to have negative impacts compared to the baseline	Option is greater than 10% worse than the baseline
	The option is expected to perform similarly to the baseline	The option is within +/- 10% of the baseline
	The option is expected to offer positive benefits compared to the baseline	The option is greater than 10% better than the baseline

At this stage in process, the options are still relatively immature and will require further evolution through detailed Instrument Flight Procedure (IFP) design, as well as based on safety requirements, our design principles, our appraisals and stakeholder engagement and consultation. Accordingly, the categorisation of quantitative performance against the baseline has applied a +/- 10% buffer.

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Summary of the IOA Methodology

Questions & Answers

Initial Options Appraisal Discontinuing Overview

IOA: Discontinuing Overview

- There is a requirement within CAP1616 to ensure a transparent approach when discontinuing options however CAP1616 does not define a shortlisting methodology.
- When determining which options to shortlist as part of this IOA, we have considered the detailed assessments against each IOA category in Appendix E CAP1616. We first considered whether there are any significant impacts in each category and then in some cases, if multiple options perform similarly against the 'do nothing' pre-implementation baseline, we have also looked at the comparative performance of each option.
- When considering the environmental assessments within the IOA, we have looked to the Air Navigation Guidance 2017 (https://www.gov.uk/government/publications/uk-airnavigation-guidance-2017).
- The Air Navigation Guidance is guidance to the CAA on its environmental objectives when carrying out its air navigation functions, and to the CAA and wider industry on airspace and noise management. The ANG outlines the Government's altitude based priorities for consideration of the environmental impacts arising from airspace change proposals.
- The following slides outlines these altitude based priorities and how they have applied to the environmental assessments within the IOA.

IOA: Discontinuing Overview

Altitude Based Priority (See B29, CAP1616 and ANG 2017)	How it's assessed within the IOA	How it's considered when shortlisting
In the airspace from the ground to below 4,000 feet, the Government's environmental priority is to limit and, where possible, reduce the total adverse noise effects on people	The day time and night time indicative partial LOAEL contours are an indicator for adverse effects from noise	The discontinuing methodology considers whether the option is expected to increase total adverse impacts compared to the baseline and where an increase occurs the option has been discontinued.*
Where options for route design from the ground to below 4,000 feet are similar in terms of the number of people affected by total adverse noise effects, preference should be given to that option which is most consistent with existing published airspace arrangements	The IOA dashboards include figures which show the differences between the baseline and the option when considering the indicative partial L_{Aeq}, N60/N65 and overflight contours.	When options perform similarly in terms of total adverse noise effects, we have considered how options compare against the 'do nothing' baseline airspace arrangements using overflight data.
In the airspace at or above 4,000 feet to below 7,000 feet, the environmental priority should continue to be minimising the impact of aviation noise in a manner consistent with the Government's overall policy on aviation noise, unless the CAA is satisfied that the evidence presented by the sponsor demonstrates this would disproportionately increase CO2 emissions	Within the IOA an indicative track mileage has been assessed on a route by route and system wide basis.	When options perform similarly in terms of total adverse noise effects, we have considered the track mileage assessments and compared whether options would be expected to result in an increase in CO2 emissions
In the airspace at or above 7,000 feet, the CAA should prioritise the reduction of aircraft CO2 emissions and the minimising of noise is no longer the priority	n/a - outside of the scope of this ACP	n/a

*The benefits/impacts to noise in terms of N60/N65 and overflight have also been considered when reviewing the options performance against the categories outlined in Appendix E CAP1616.

IOA: Discontinuing Overview

Altitude Based Priority (See B29, CAP1616 and ANG 2017)	How it's assessed within the IOA	How it's considered when shortlisting
Where practicable, it is desirable that airspace routes below 7,000 feet should seek to avoid flying over Areas of Outstanding Natural Beauty (AONB) and National Parks	The IOA contains data on the overflight and N65 metrics for AONBs and National Parks	Benefits/Impacts to tranquillity has been considered when reviewing the options performance against the categories outlined in Appendix E CAP1616
All changes below 7,000 feet should take into account local circumstances in the development of the airspace design, including the actual height of the ground level being overflown, and should not be agreed to by the CAA before appropriate community engagement has been conducted by the sponsor.	The IOA contains data on Schools, Hospitals and Places of worship overflown as well as sites of tranquillity and biodiversity. Actual height above ground level is incorporated into the noise model.	Benefits/Impacts to local circumstances have been considered when reviewing the options performance against the categories outlined in Appendix E CAP1616

The threshold for discounting an option cannot be based on quantitative assessments alone but must also come down to the qualitative appraisals and professional judgment, as there are many factors and IOA categories to balance.

The following slides provide a summary of the IOA conclusions. Full details will be shown as part of the Stage 2 submission documents.

Discontinuing Overview: Arrivals

Single Route PBN	Two Route PBN	Three/Four Route PBN

The PBN Arrival Options have been split into three groups:

- Single route PBN arrival options
- Two route PBN arrival options (for respite)
- Three/four route PBN arrival options (for respite)

The routes which arrive from the north and the Radar Maneuvering Area (RMA) (also known as a vectoring area) have been assessed separately.

Discontinuing Overview: Arrivals

Single Route PBN (Westerlies)

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
WAA	Yes	These options have broadly the same performance in terms of the daytime indicative partial LOAEL (all are similar to the baseline) and all options improve population in the nighttime LOAEL. We therefore looked to the other IOA assessment categories and the ANG altitude based priorities to understand any key differentiators between the options. WAC and WAO are outside of the main swathe of the 'do nothing' arrivals and are therefore significantly different from the existing airspace arrangements. They join the final approach at less than 8nm and this means they cannot be a flown as PBN-ILS arrival transitions which impacts the frequency they can be used and therefore the amount of benefit the option can realise. Although all westerly single PBN arrival options increased overflight of AONBs to varying extents, options WAC and WAO suggested substantial increases compared to other options. For these reasons combined, WAC and WAO were discontinued. The remaining options WAA, WAF, WAH, WAK, WAL are continued to Stage 3.
WAC	No	
WAF	Yes	
WAH	Yes	
WAK	Yes	
WAL	Yes	
WAO	No	
WAP	No	Population increase in indicative partial daytime LOAEL. Significant increase in partial N60/N65 and new population overflown. Complexities with integration with network and departures. Route design on the limits of IFP design criteria.
WAQ	No	Population increase in indicative partial day and night LOAEL. Significant increase in partial N60/N65 and new population overflown. Complexities with integration with network and departures. Route design on the limits of IFP design criteria.

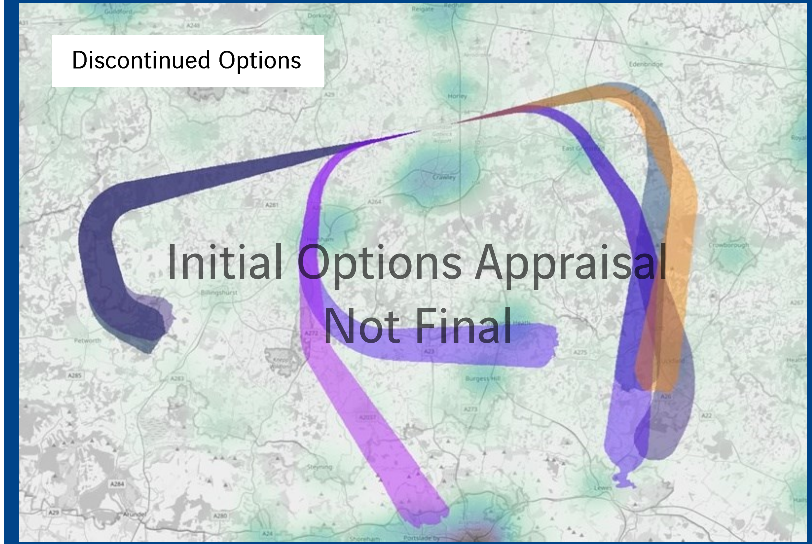
Discontinuing Overview: Arrivals

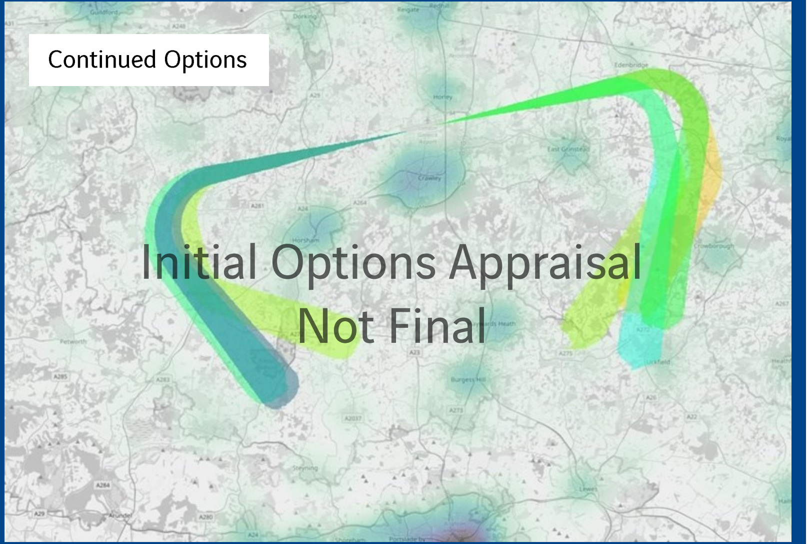
Single Route PBN (Easterlies)

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
EAA / EAF	No	Options EAA/EAF, EAC, EAG, EAI, EAM and EAN have the same performance in terms of the indicative partial daytime and night time LOAEL (all are broadly similar to the baseline). We therefore looked to the other IOA assessment categories and the ANG altitude based priorities to understand any key differentiators between the options. EAA/EAF and EAM have a long final approach, joining at c.14nm and they are expected to increased track miles compared to the average baseline arrival and the other options. This longer join onto final approach is also outside of the main swathe of concentration in the 'do nothing' existing airspace arrangements although there are some flights in this area. The interdependency assessment and feedback from NERL noted that options EAA/EAF and EAM are highly likely to have interactions with Farnborough and Heathrow traffic. For these reasons combined, EAA/EAF and EAM were discontinued. The remaining options, EAC/EAN, EAG, EAI are continued to Stage 3.
EAC/EAN	Yes	
EAG	Yes	
EAI	Yes	
EAM	No	
EAO	No	Population increase in daytime LOAEL. Significant increase in N60/N65 and new population overflown. Complexities with integration with network and departures. Route design on the limits of IFP design criteria.
EAP	No	Significant increase in N60/N65 and new population overflown. Complexities with integration with network and departures. Route design on the limits of IFP design criteria.

Discontinuing Overview: Arrivals

Single Route PBN





All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

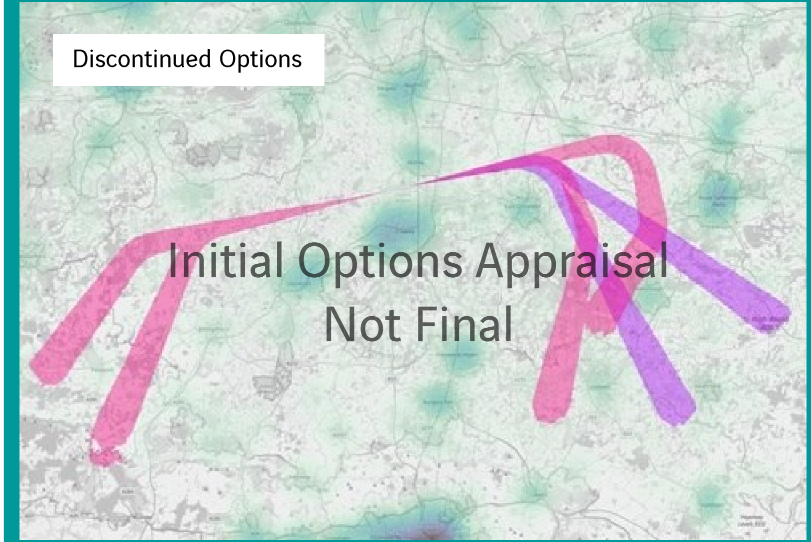
Discontinuing Overview: Arrivals

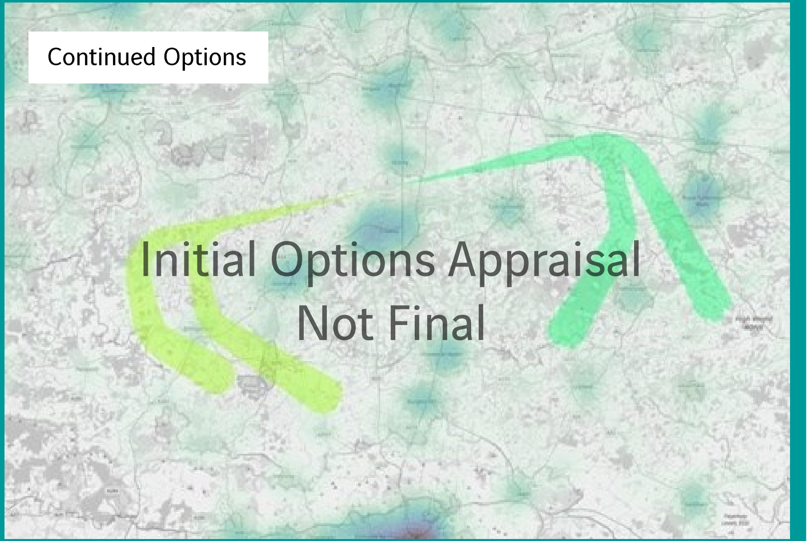
Two Route PBN

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerly Respite Options		
WAD	Yes	WAD and WAE have broadly the same performance in terms of the indicative partial daytime LOAEL (both are similar to the baseline) and the options improve population in the partial nighttime LOAEL. WAM offers improved performance in the partial daytime and nighttime LOAEL. Although WAM offers improved partial daytime LOAEL performance, it joins the ILS at less than 8nm – this means it cannot be operated as PBN to ILS transition which impacts the frequency it can be used and therefore the amount of benefit the option can realise. The routes within WAE also join the ILS at less than 8nm and therefore similar to WAM the amount of benefit the option can realise is reduced. The integration assessment also highlighted that WAE would require modification to integrate with the future airspace network. WAE and the eastern route of WAM are outside of the existing airspace arrangements.
WAE	No	
WAM	No	
Easterly Respite Options		
EAK	No	Options EAK and EAL have the same performance in terms of the indicative partial daytime and night time LOAEL (both are broadly similar to the baseline). We therefore looked to the other IOA assessment categories and the ANG altitude based priorities to understand any key differentiators between the options. Option EAL is closest to existing airspace arrangements. Based on indicative information from NERL around the arrival mechanism above 7000ft, it is expected that EAK would increase track mileage compared to the baseline whereas EAL is expected to remain similar to the baseline.
EAL	Yes	

Discontinuing Overview: Arrivals

Two Route PBN





All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

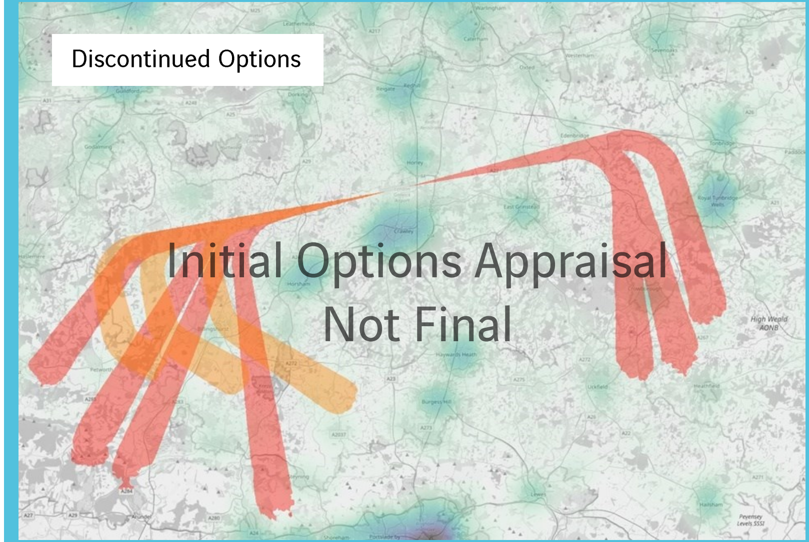
Discontinuing Overview: Arrivals

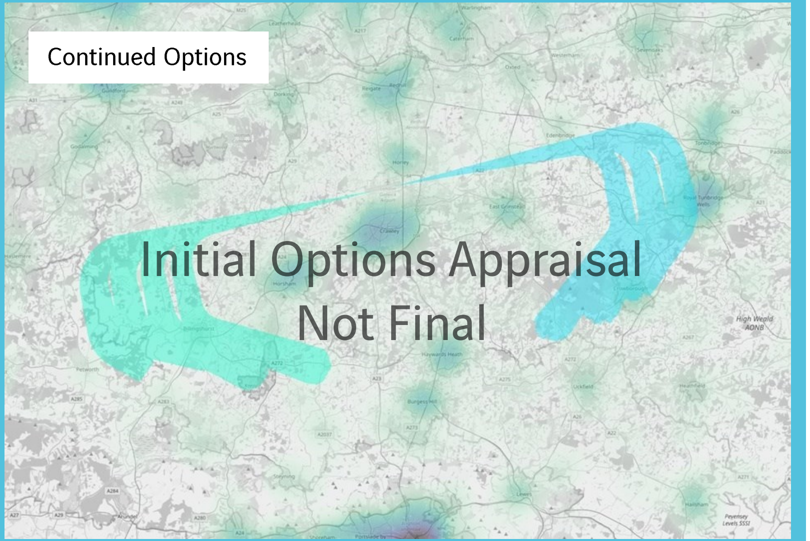
Three/four Route PBN

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerly Respite Options		
WAI	Yes	WAI and WAJ have broadly the same performance in terms of the indicative partial daytime LOAEL (both are similar to the baseline) and the options improve population in the nighttime LOAEL. We therefore looked to the other IOA assessment categories and the ANG altitude based priorities to understand any key differentiators between the options. The configuration of WAI offers greater potential for respite compared to WAJ where some routes converge. WAI also performs better in terms of population newly overflown and existing airspace arrangements.
WAJ	No	
Easterly Respite Options		
EAD	No	These options have the same performance in terms of the indicative partial daytime and night time LOAEL (all are broadly similar to the baseline). We therefore looked to the other IOA assessment categories and the ANG altitude based priorities to understand any key differentiators between the options. Two of the four routes in EAD join the ILS at less than 8nm – this means they cannot be operated as PBN to ILS transitions which impacts the frequency they can be used and therefore the amount of benefit the option can realise. In addition to this, the routes in EAD converge and therefore other options may offer greater opportunities for respite. Finally EAD is expected to increase track miles compared to the average baseline and the other options. When comparing EAE and EAJ, EAE increases population in the N60 contour compared to the baseline whereas EAJ offers similar performance to what happens today.
EAE	No	
EAJ	Yes	

Discontinuing Overview: Arrivals

Three/four Route PBN





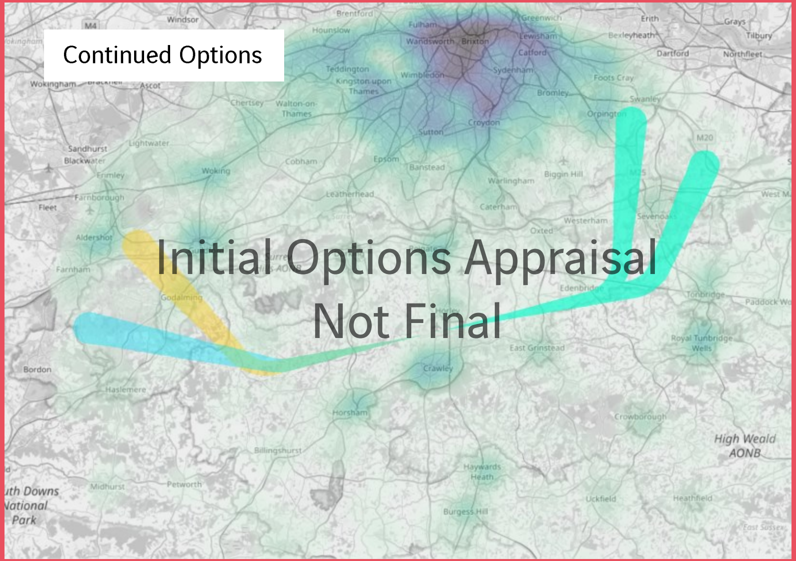
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

Discontinuing Overview: Arrivals

Northerly Arrival Routes

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerlies		
WAD/ WAE	Yes	These options offer significant track mileage, fuel burn and CO2 savings however they have interdependencies with the wider airspace network which will require further investigation at Stage 3.
Easterlies		
EAC	Yes	These options offer significant track mileage, fuel burn and CO2 savings however they have interdependencies with the wider airspace network which will require further investigation at Stage 3.
EAF	Yes	



All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

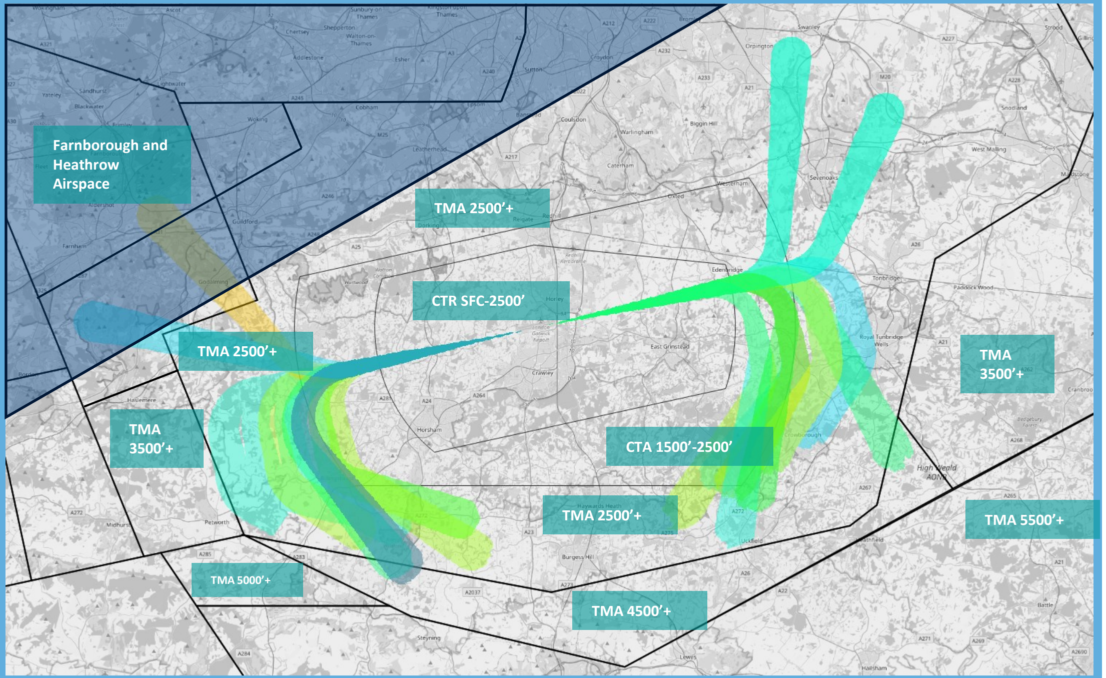
Discontinuing Overview: All Continued PBN Arrivals Options with existing CAS Boundaries

Current CAS Boundary
Gatwick CTR/CTA

Boxes show current vertical controlled airspace (CAS) level boundaries. Note-above the CTR and CTA the TMA extends upwards to 19,500'. The '+' on the other boxes also indicates CAS to 19,500'

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Discontinuing Overview: Arrivals

Radar manoeuvring areas

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerlies		
8-12nm	Yes	All joining bands have broadly the same performance in terms of the indicative partial daytime LOAEL (all are similar to the baseline) and the options improve population in the nighttime LOAEL. Beyond 14nm, the tracks are outside of the main swathe of concentration in the baseline, have the potential to increase track mileage compared to an average arrival today. Integration with the wider airspace network would also require further investigation.
9-13nm	Yes	
10-14nm	Yes	
11-15nm	No	
12-16nm	No	
Easterlies		
8-12nm	Yes	All joining bands have broadly the same performance in terms of the indicative partial daytime and nighttime LOAEL (all are similar to the baseline). Beyond 14nm, the tracks are outside of the main swathe of concentration in the baseline, have the potential to increase track mileage compared to an average arrival today, and there may be an impact to General Aviation. There are also significant concerns with integrating these arrivals into the wider airspace network.
9-13nm	Yes	
10-14nm	Yes	
11-15nm	No	
12-16nm	No	

Discontinuing Overview: Departures

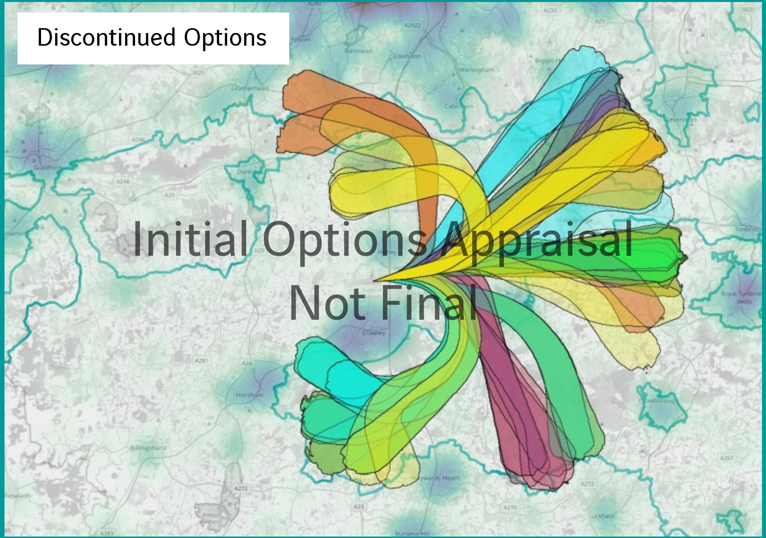
Easterly Departures

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Easterly System 1	No	Increases population within the indicative partial daytime and nighttime LOAEL
Easterly System 2	Yes	This option is expected reduce (improve) population within the indicative partial daytime and nighttime LOAEL compared to the 'do nothing' baseline. It also offers improvements in the N60/N65 metrics and has the potential to improve track mileage.
Easterly System 3	No	Increases population within the indicative partial daytime LOAEL
Easterly System 4	No	Increases population within the indicative partial daytime LOAEL
Easterly System 5	No	Easterly System 5 is the same as Easterly System 2 with the exception of the XAM routes. The IOA has found that the XAM routes in Easterly System 5 are not viable due to integration with arrivals and the airspace network above 7000ft therefore Easterly System 2 has proceeded to Stage 3 and Easterly System 5 has been discontinued.
Easterly System 6	No	Increases population within the indicative partial daytime LOAEL
Easterly System 7	No	Increases population within the indicative partial daytime and nighttime LOAEL
Easterly System 8	Yes	This option is expected reduce (improve) population within the indicative partial daytime and nighttime LOAEL compared to the 'do nothing' baseline. It also offers improvements in the partial N60/N65 metrics and has the potential to improve track mileage.
Easterly System 9	Yes	This option is expected reduce (improve) population within the indicative partial daytime and nighttime LOAEL compared to the 'do nothing' baseline. It also offers improvements in the partial N60/N65 metrics and has the potential to improve track mileage.

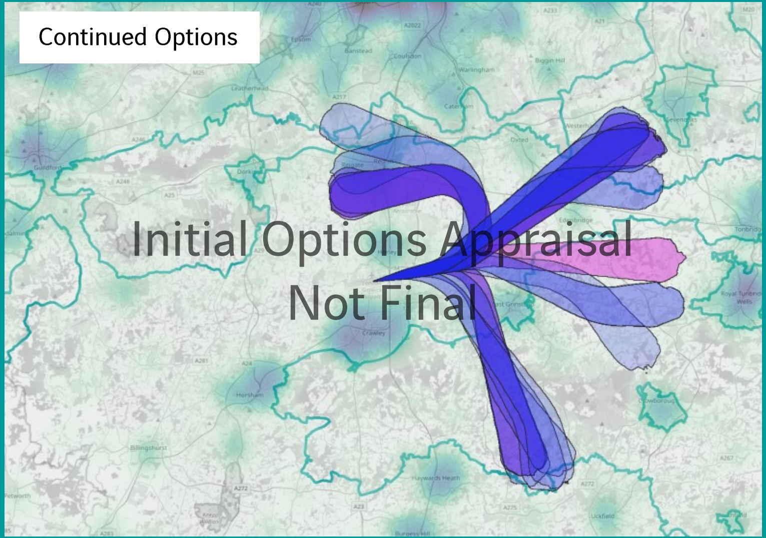
Discontinuing Overview: Departures

Easterly Departures

Discontinued Options



Continued Options



All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

Discontinuing Overview: Departures

Westerly Departures

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerly System 1	No	Increases population within the indicative partial daytime LOAEL
Westerly System 2	No	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline and reduce (improve) population within the partial nighttime LOAEL however when considering the secondary noise metrics, this option would result in significant increases in population within the daytime and nighttime N65 and N60 contours.
Westerly System 3	Yes	This option is expected to maintain population within the indicative partial daytime and nighttime LOAEL broadly the same as the 'do nothing' baseline. However, it offers improvements in the N60/N65 metrics and has the potential to improve track mileage. The option reduces interdependencies with airports to the north of Gatwick which may result in improved climb performance.
Westerly System 4	No	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline and reduce (improve) population within the partial nighttime LOAEL however when considering the secondary noise metrics, this option would result in significant increases in population within the partial daytime N65 contour. The DAGGA / TNT departures are expected to have significant interdependencies within the network airspace above 7000ft and these route designs are expected to be on the limits of IFP design criteria.
Westerly System 5 (Majority of DVR traffic turning north)	Yes	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline and reduce (improve) population within the partial nighttime LOAEL When considering the secondary metrics, there is an improvement in nighttime N60 and an increase in population in daytime N65 however compared to the baseline (and some other options) the configuration helps share noise, rather than the DAGGA/TNT following the same track as the DVR departures. It has the potential to improve track mileage.

Discontinuing Overview: Departures

Westerly Departures

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerly System 5 (Majority of DVR traffic turning south)	Yes	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline. The nighttime LOAEL is expected to improve compared to the baseline. It also offers improvements in the N60/N65 metrics and has the potential to improve track mileage.
Westerly System 6 (Majority of DVR traffic turning north)	No	Increases population within the indicative partial daytime LOAEL
Westerly System 6 (Majority of DVR traffic turning south)	Yes	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline. The partial nighttime LOAEL is expected to improve compared to the baseline. There is an improvement in nighttime N60 and a small increase of population in daytime N65 however compared to the baseline (and some other options) the configuration helps share noise, rather than the DAGGA/TNT following the same track as the DVR departures. It has the potential to improve track mileage.
Westerly System 6 (Majority of DVR traffic turning north and XAM traffic turning early left)	No	Increases population within the indicative partial daytime LOAEL
Westerly System 7 (Majority of DVR traffic turning north)	No	Increases population within the indicative partial daytime LOAEL
Westerly System 7 (Majority of DVR traffic turning south)	No	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline and reduce (improve) population within the partial nighttime LOAEL however when considering the secondary noise metrics, this option would result in significant increases in population within the daytime and nighttime partial N65 and N60 contours.

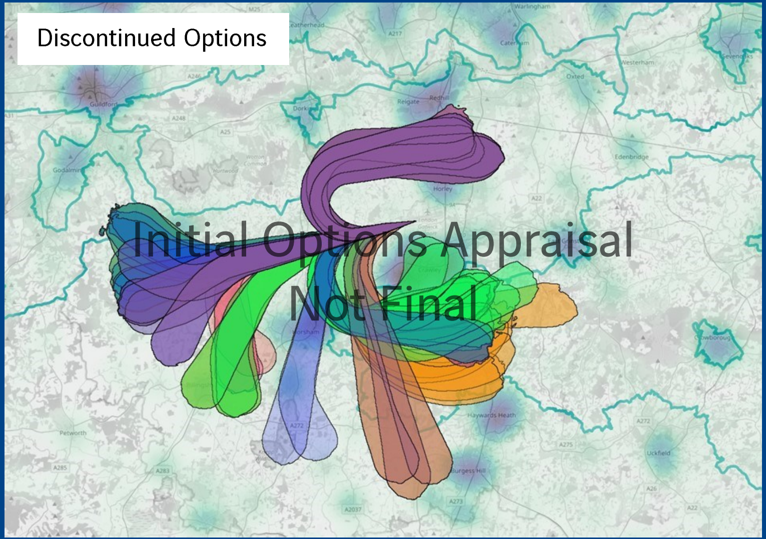
Discontinuing Overview: Departures

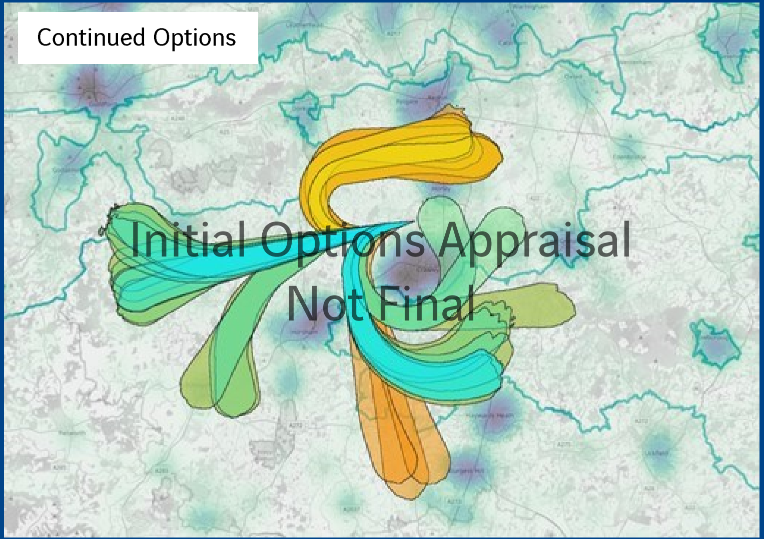
Westerly Departures

Option Name	Continued to Stage 3	Shortlisting Rationale (Summary of key points – full details will be in Step 2B submission document)
Westerly System 8 (Majority of DVR traffic turning north)	No	Increases population within the indicative partial daytime LOAEL
Westerly System 8 (Majority of DVR traffic turning south)	No	This option is expected to maintain population within the indicative partial daytime LOAEL broadly the same as the 'do nothing' baseline and reduce (improve) population within the partial nighttime LOAEL however when considering the secondary noise metrics, this option would result in significant increases in population within the daytime and nighttime N65 and N60 contours.

Discontinuing Overview: Departures

Westerly Departures





All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

The options and data shown in this document are subject to change and should not be considered final.

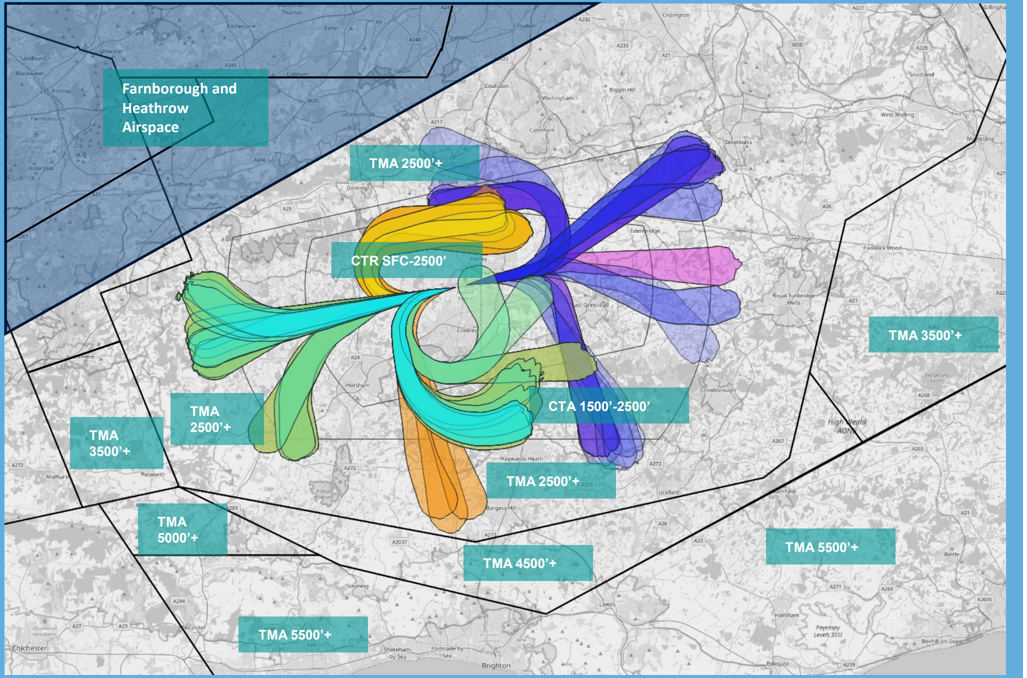
Discontinuing Overview: All Continued PBN Departure Options with existing CAS Boundaries

Current CAS Boundary
Gatwick CTR/CTA

Boxes show current vertical controlled airspace (CAS) level boundaries. Note-above the CTR and CTA the TMA extends upwards to 19,500'. The '+' on the other boxes also indicates CAS to 19,500'

The options and data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Discontinuing Options Overview

Questions & Answers

Next Steps and close

We will submit the Stage 2 documentation to the CAA on the 1st September 2023

The documents will be published on the CAA's Airspace Change Portal: https://airspacechange.caa.co.uk/PublicProposalArea?pID=54

Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.

If you have any questions or comments, please don't hesitate to contact us via LGWairspace.FASIS@gatwickairport.com

THANK YOU

LONDON GATWICK

POWERED BY VINCI AIRPORTS | GLOBAL INFRASTRUCTURE PARTNERS

Gatwick Airport FASI South Airspace Change Proposal

Update for stakeholder on the methodology and outcomes of the Step 2B Initial Options Appraisal

Option Images

Version 1.0

LONDON GATWICK

POWERED BY VINCI AIRPORTS | GLOBAL INFRASTRUCTURE PARTNERS

Important Information

Following the Stakeholder Engagement workshops held on the 28th, 31st and 2nd August 2023, this document is the option information pack which should be read alongside the main presentation that provides an overview of the Stage 2 outcomes for the Gatwick element of the Future Airspace strategy Implementation - South airspace change programme.

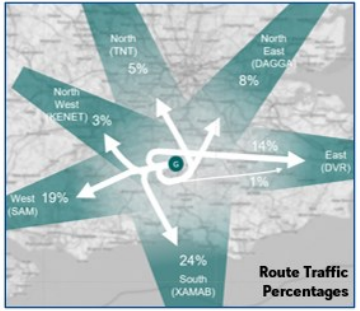
Gatwick Airport has chosen to undertake engagement above and beyond the requirements of CAP1616 in the spirit of openness, transparency and continued dialogue between airport sponsor and stakeholders. The information within these documents is provided to facilitate discussions on the IOA methodology and should not be considered final. **We ask that stakeholders consider the preliminary nature of the information when reporting back to their organisations and care should be taken to ensure that all Airspace Change Proposal information is replicated fully, accurately and in context.** All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with CAP1616 guidance, safety requirements, our design principles, our appraisals and stakeholder engagement and consultation input.

If you have any questions or feedback regarding the Initial Options Appraisal (IOA) methodology or the presentation, please do get in touch via the LGWairspace.FASIS@gatwickairport.com email address. Please note that there will be opportunities as part of Stage 3 to discuss and feedback on the specific geographical areas or potential impact of the flight path options.

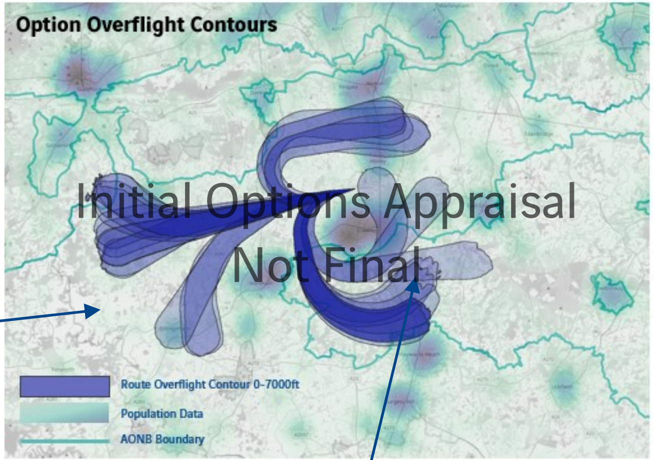
Departures

Understanding the options: Departures

This image shows the anticipated traffic percentages to each network exit point.
It is particularly useful to refer to for some options where there are multiple traffic scenarios.



The larger image details the option overflight contours from 0-7000ft. The contours are based on the CAA's CAP1498 48.5° definition of overflight.



The overflight contours are not always perfectly rounded at 7000ft because they account for terrain.

The options and any data shown in this document should not be considered final.

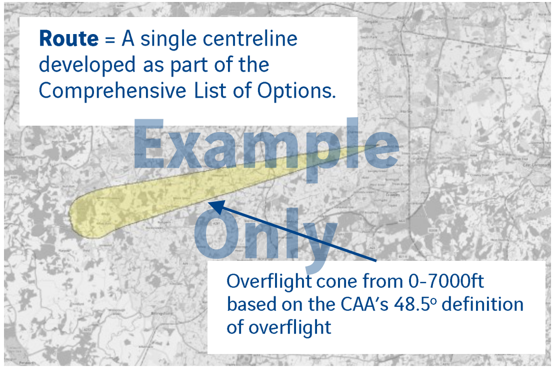
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

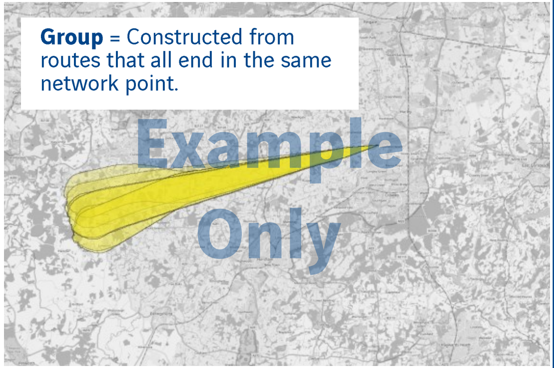
Route Overflight Contour 0-7000ft

Population Data

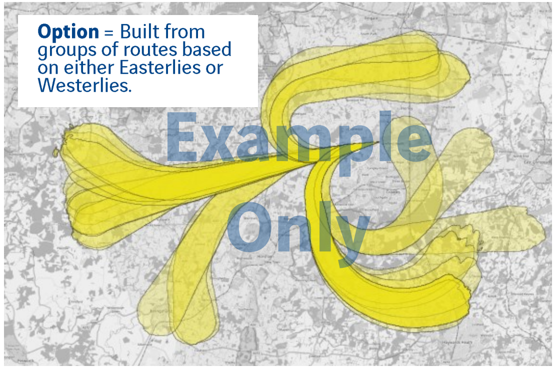
AONB Boundary

Understanding the options: Departures

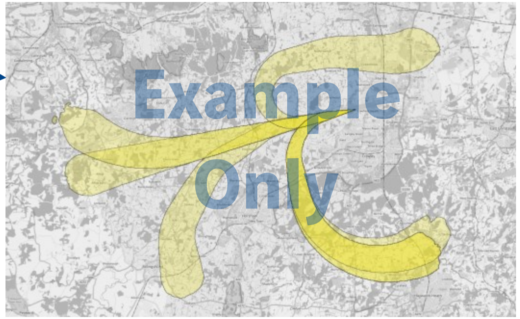




Assessed within the IOA



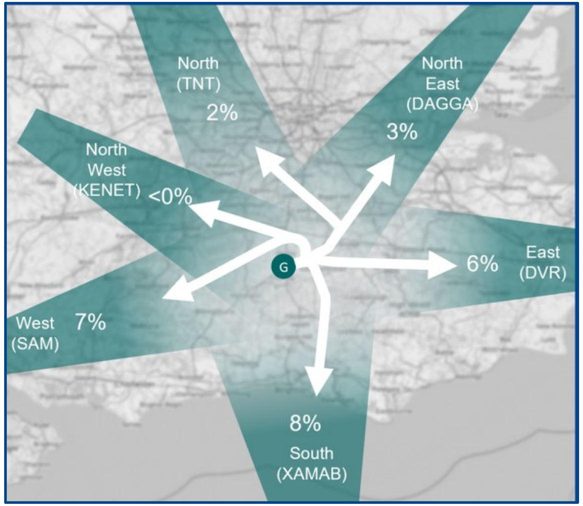
As the ACP progresses, the groups within the options will be refined until each option has a single route centreline which serves each network exit point. Development of the options to explore equitable distribution of noise, such as respite routes, will form part of Stage 3.



All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

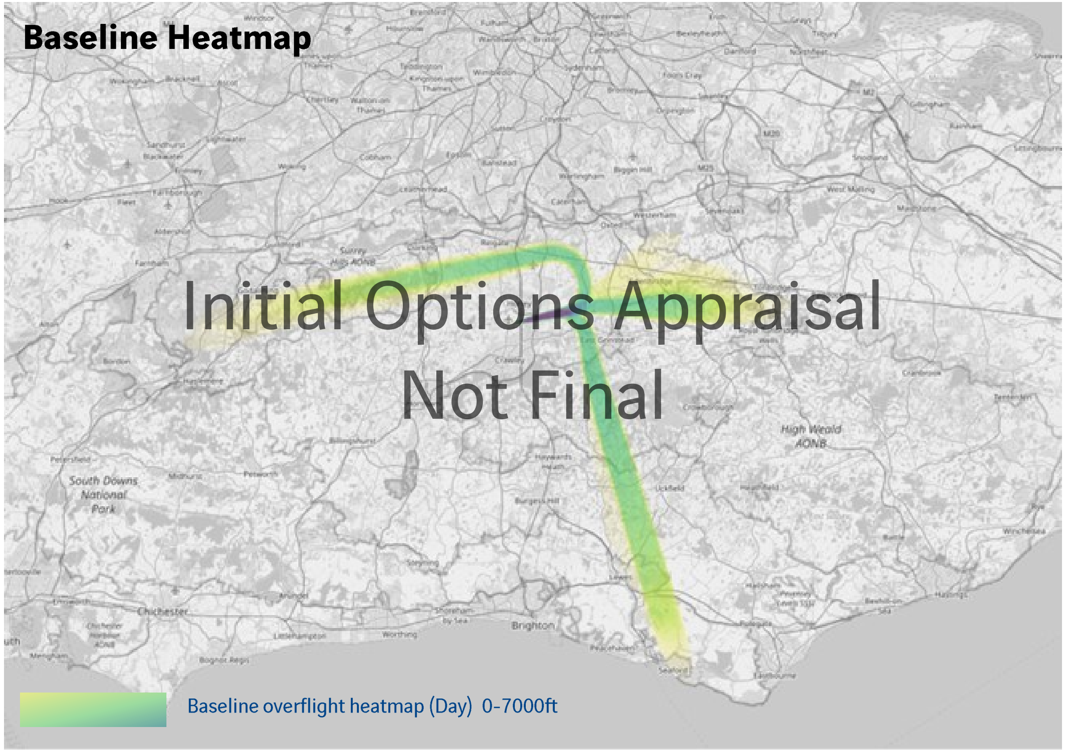
The options and data shown in this document are subject to change and should not be considered final.

Easterly Departure Baseline

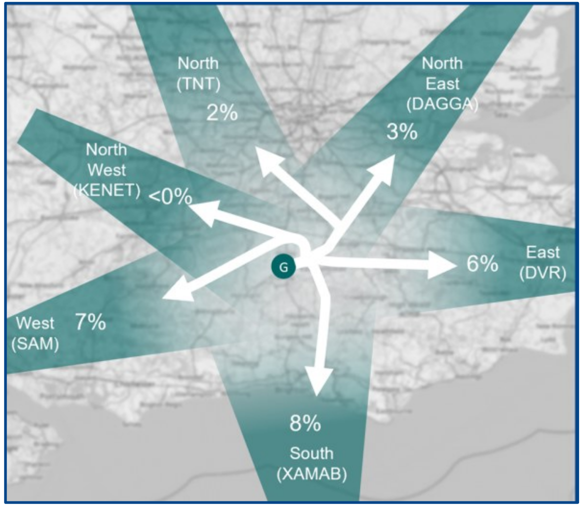


The options and any data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

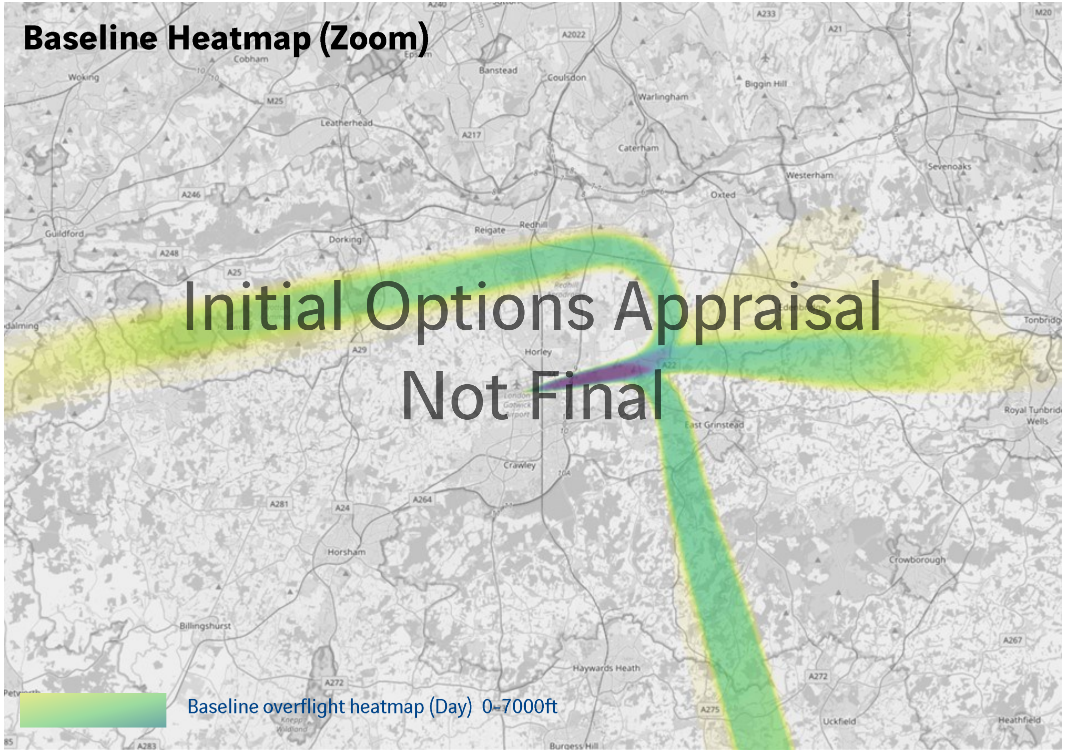


Easterly Departure Baseline

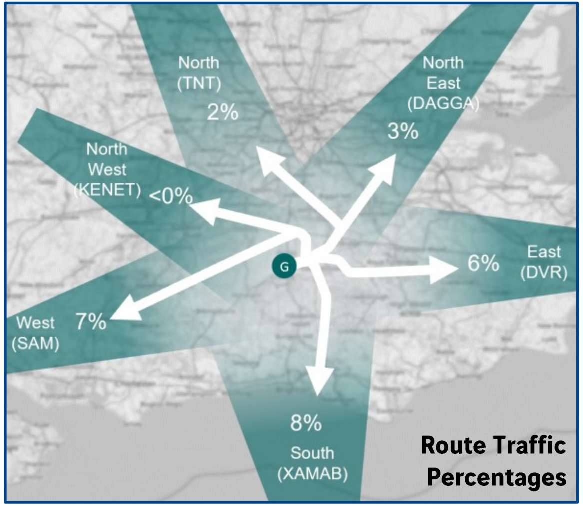


The options and any data shown in this document are subject to change and should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

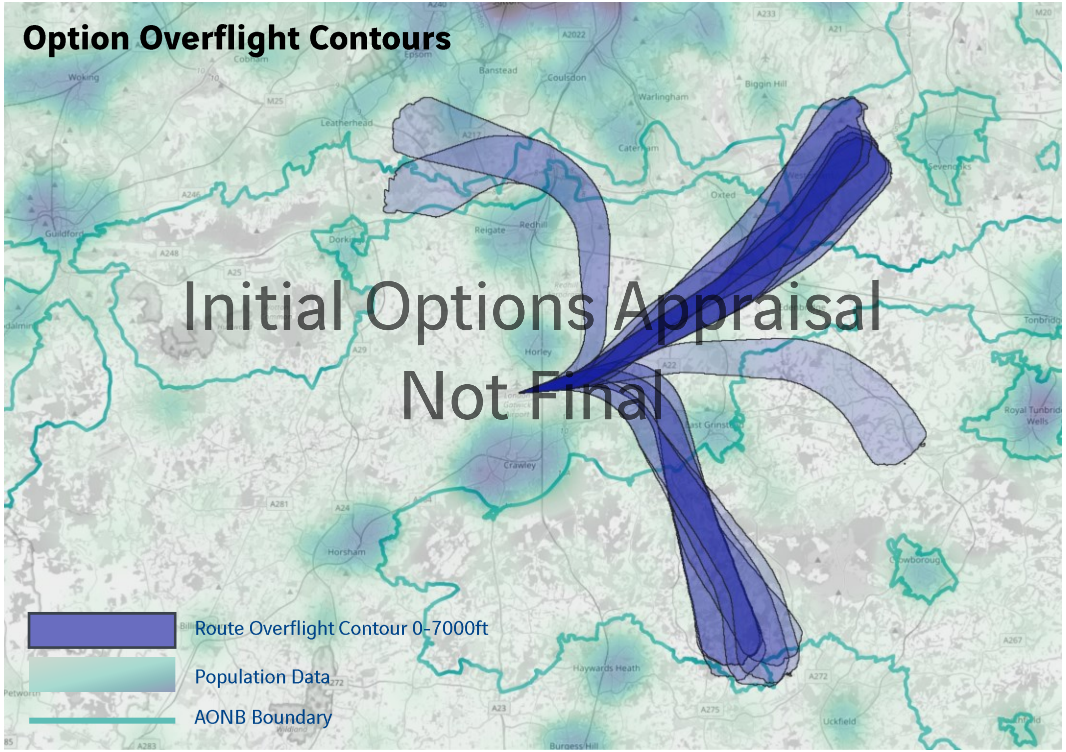


Easterly System 1

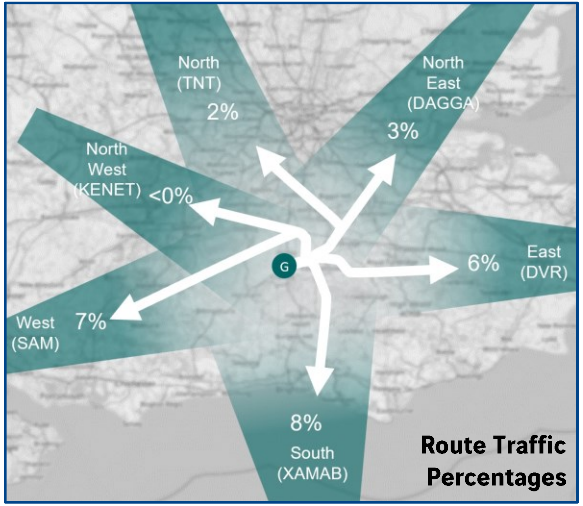


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

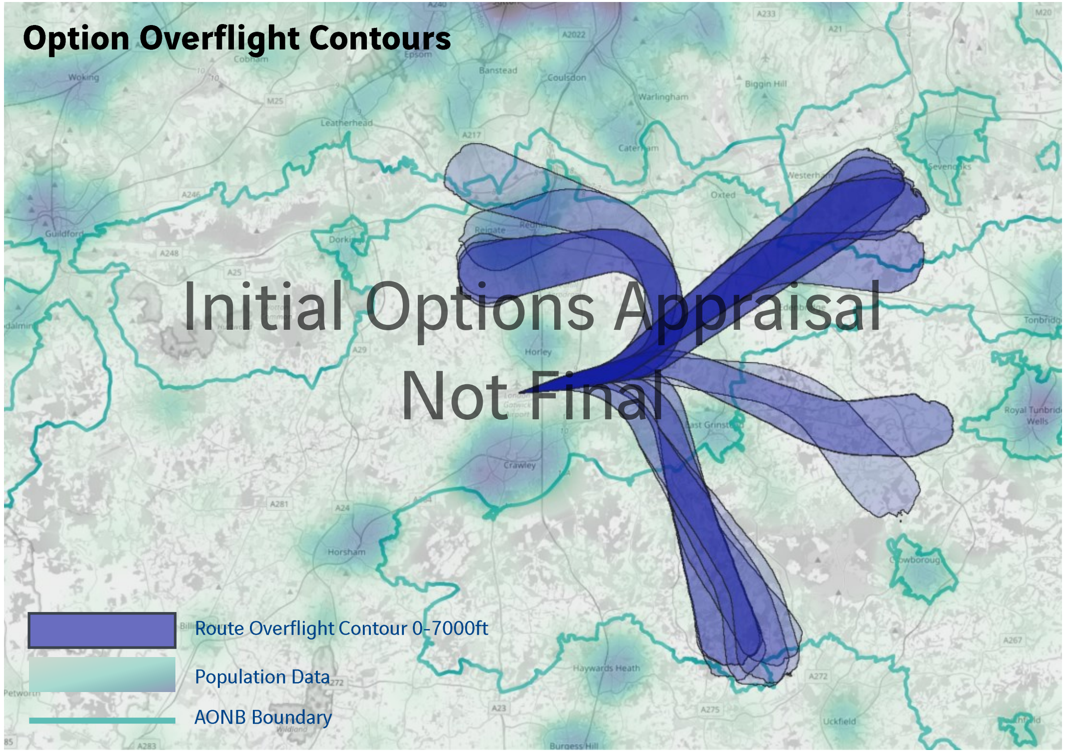


Easterly System 2

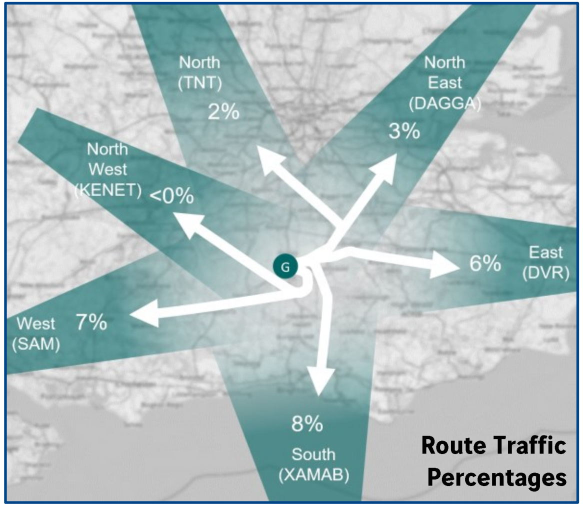


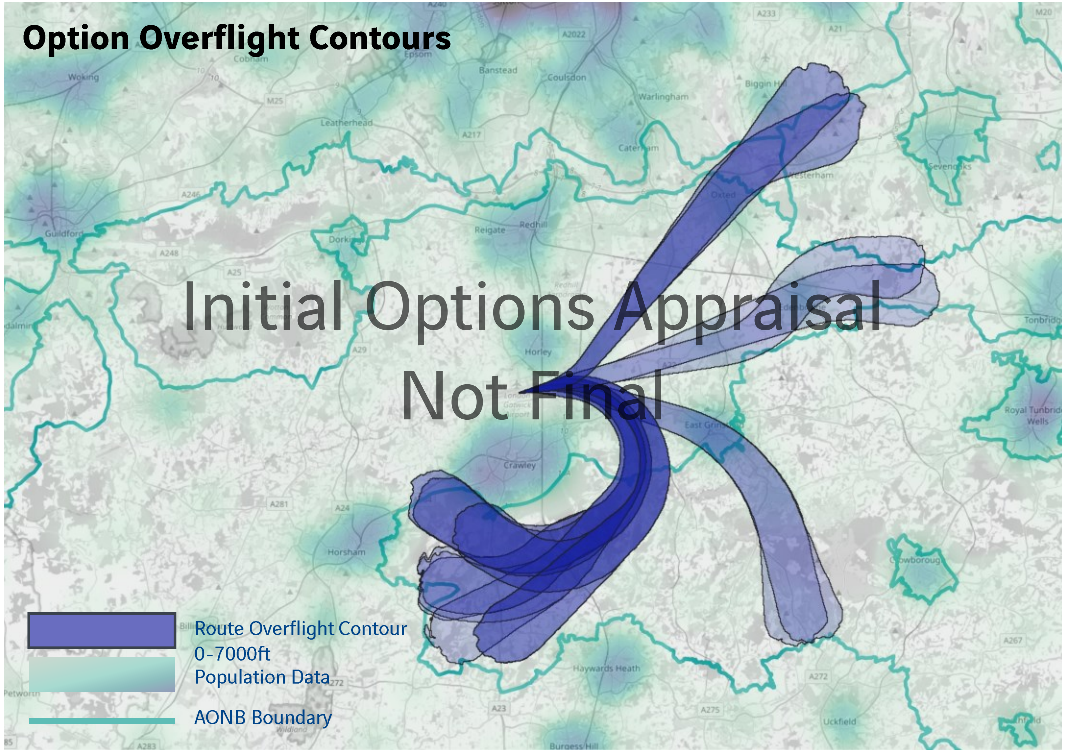
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Easterly System 3

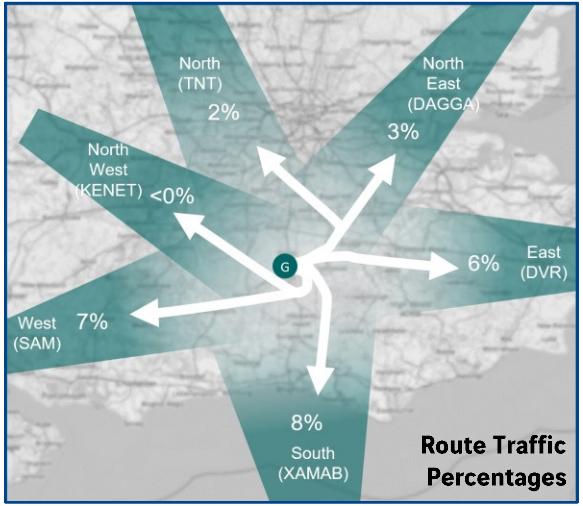


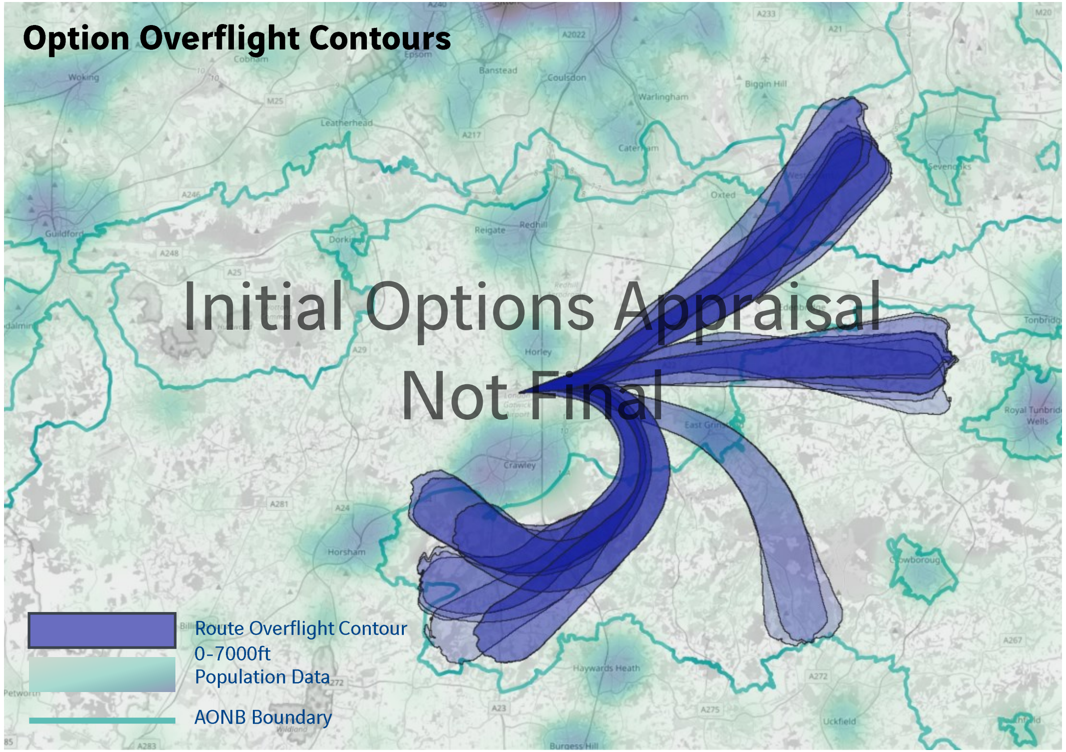


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly System 4

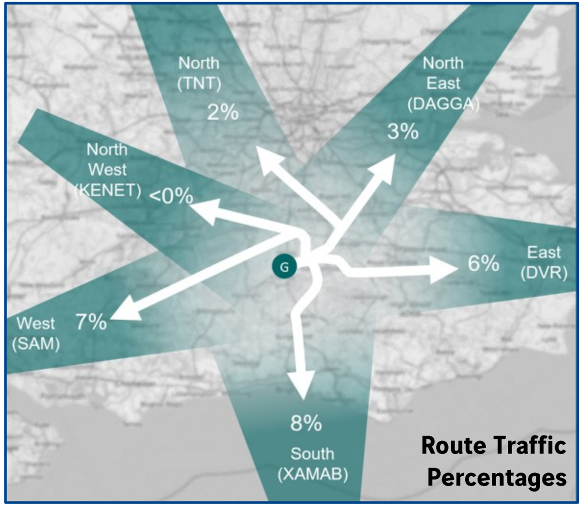


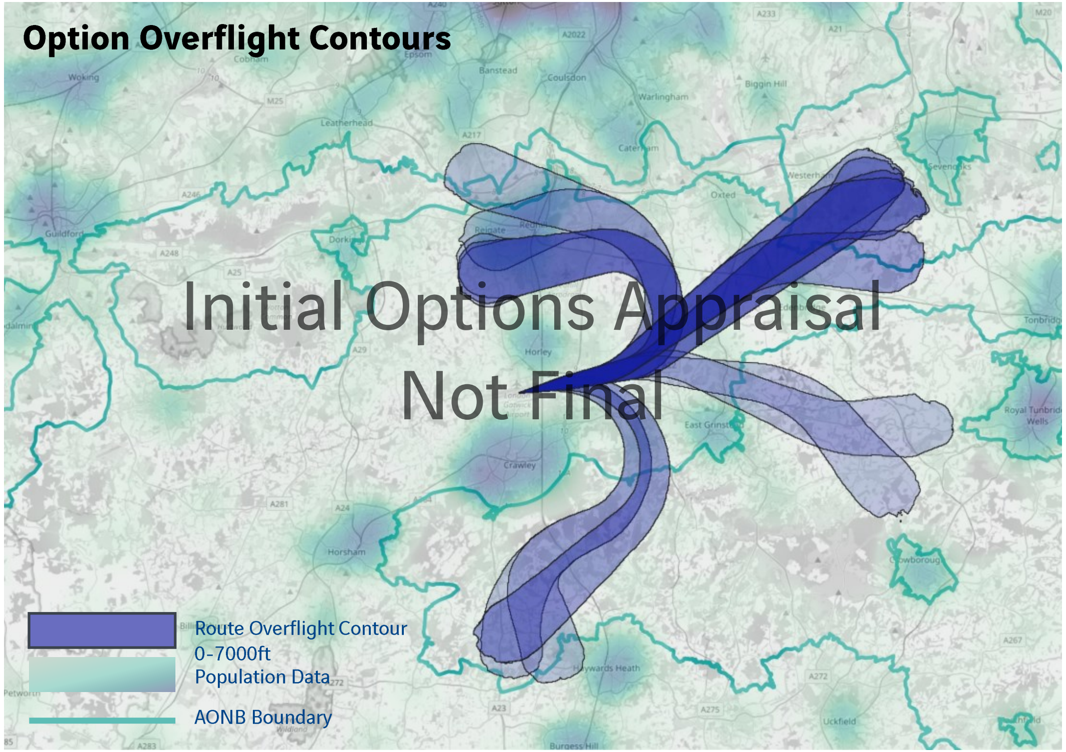


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly System 5

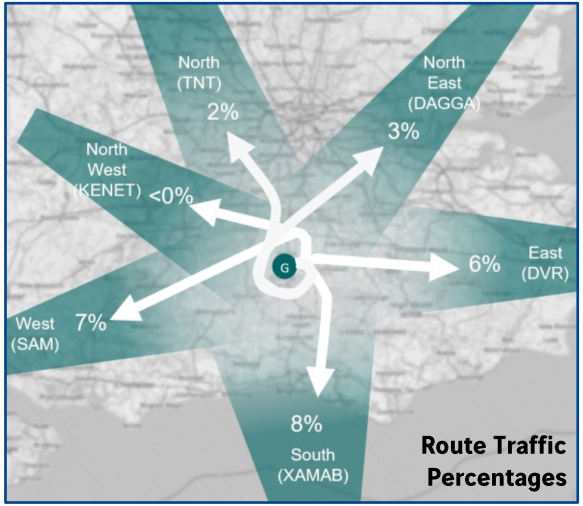


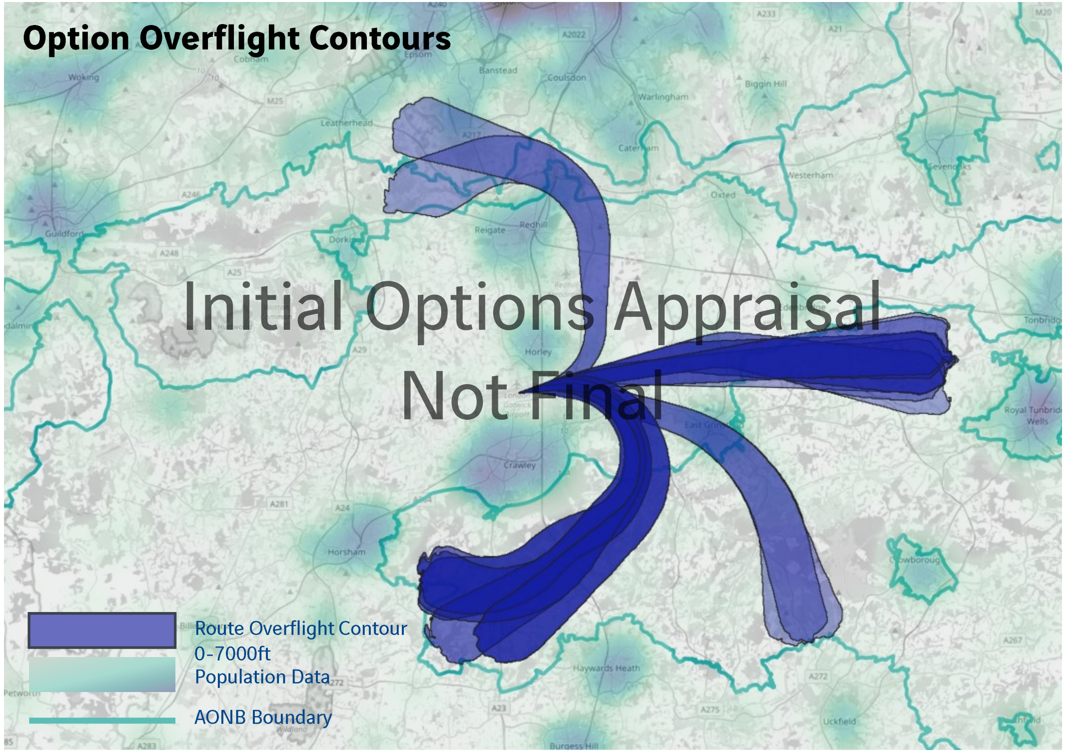


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly System 6

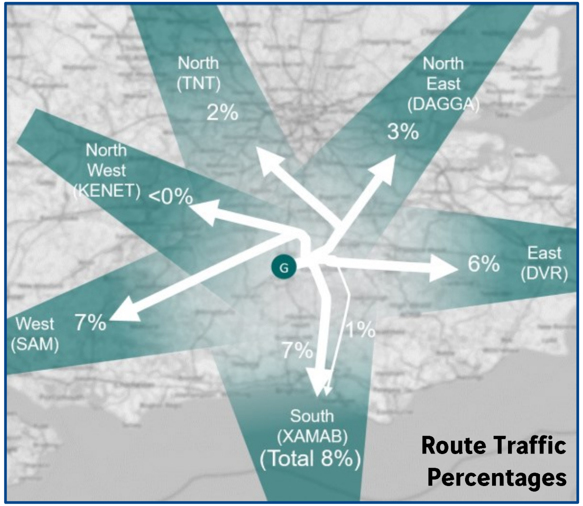


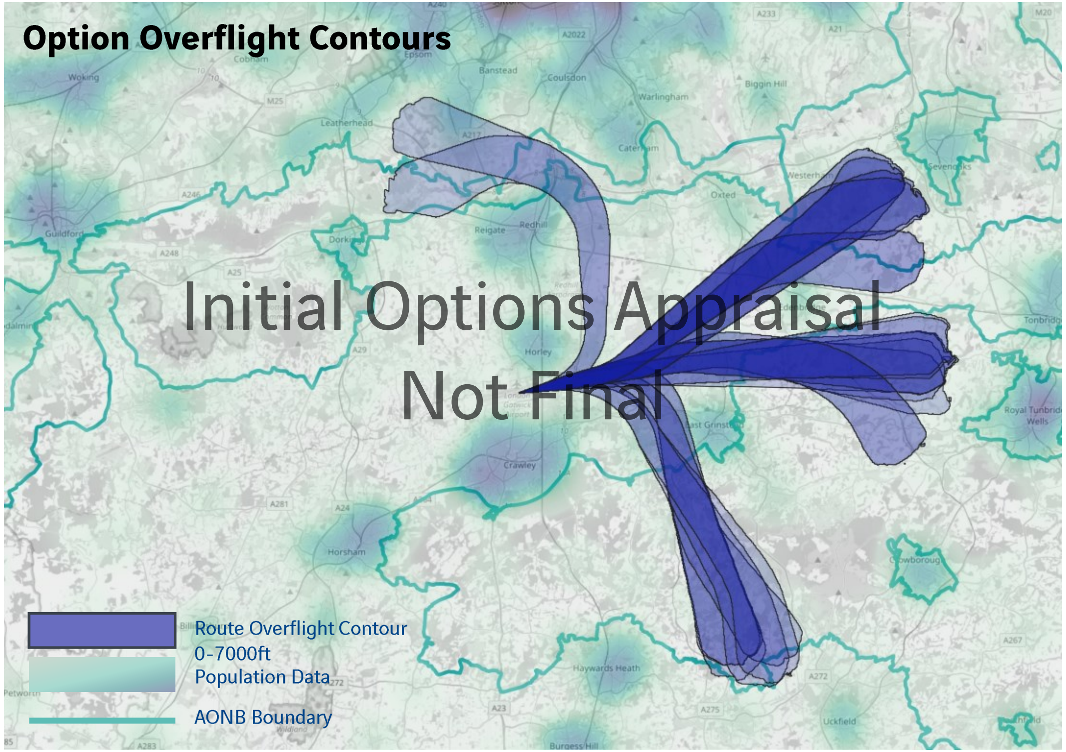


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly System 7

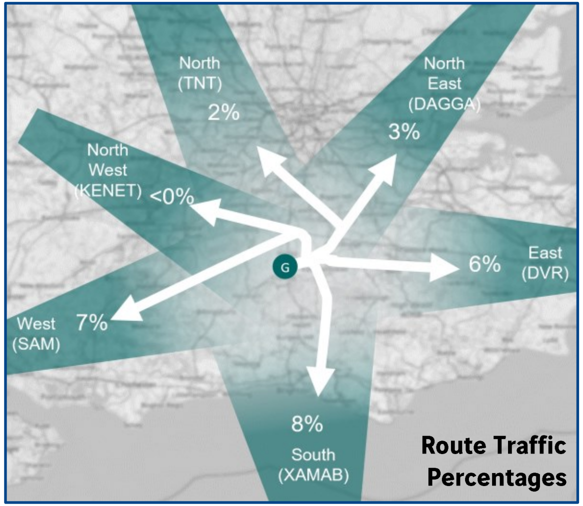


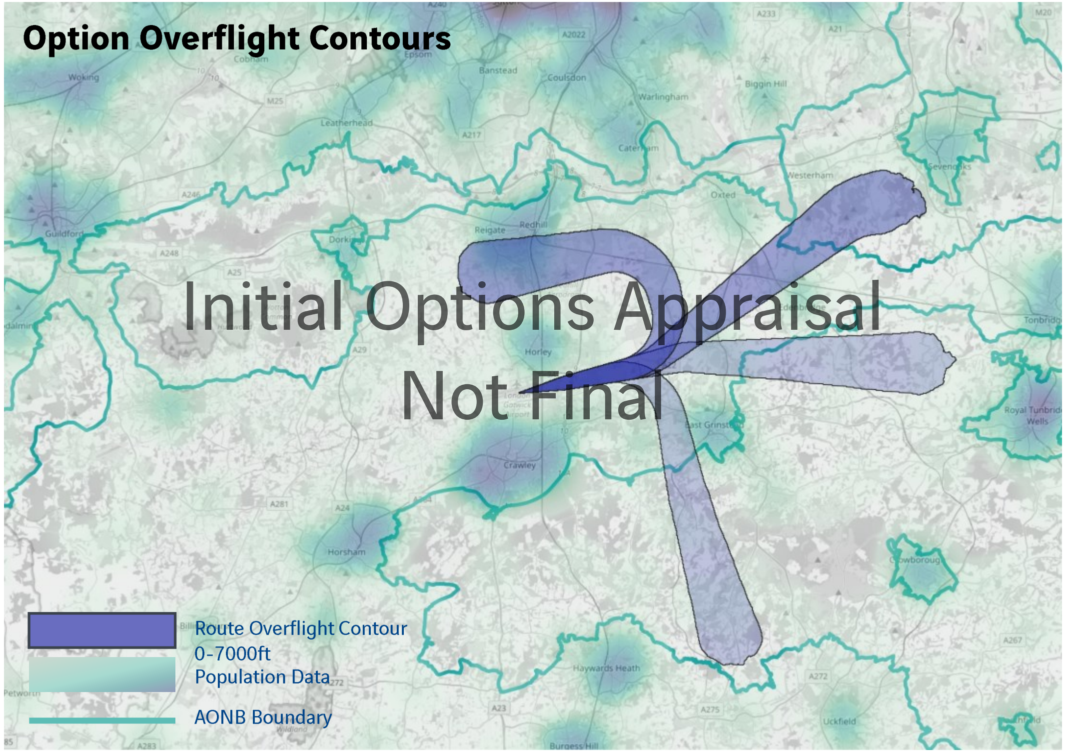


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly System 8

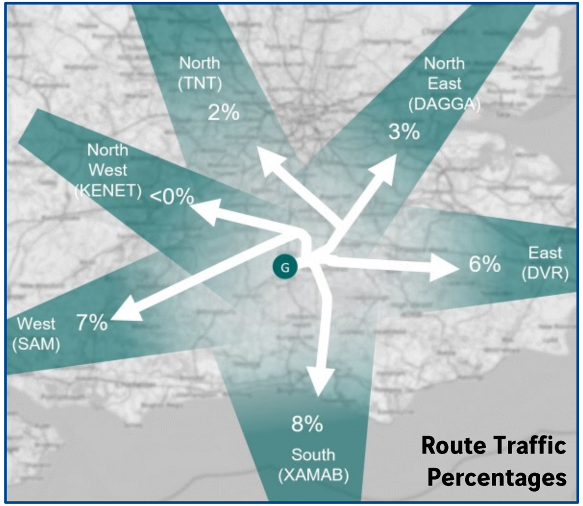


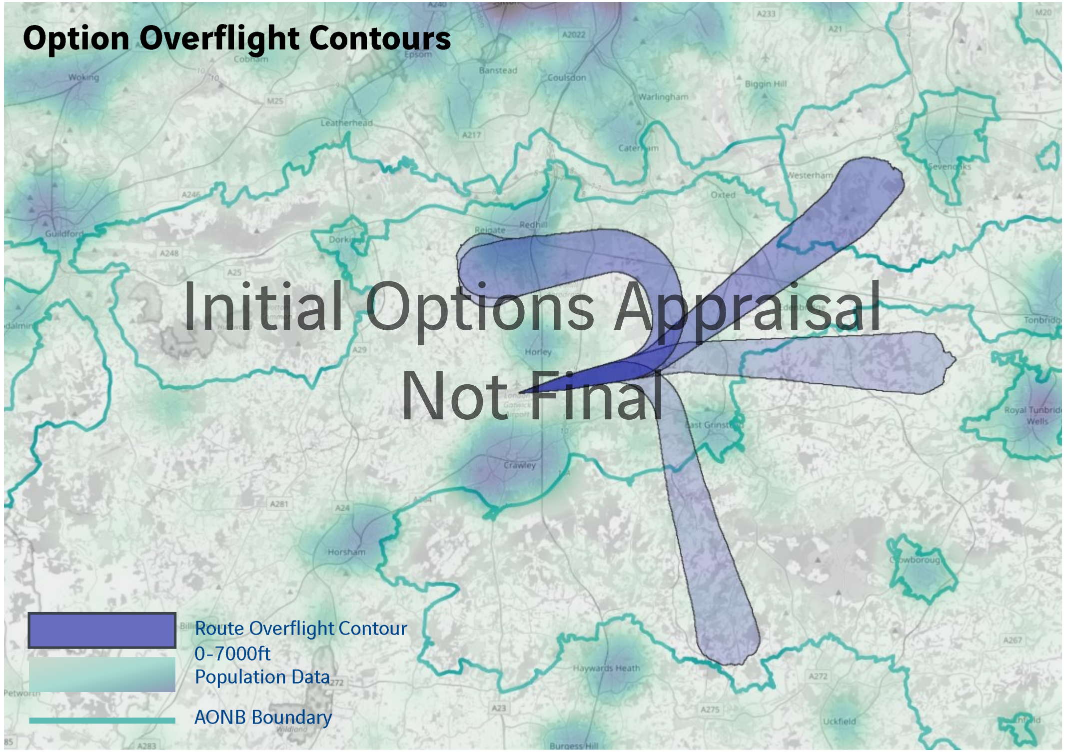


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly System 9

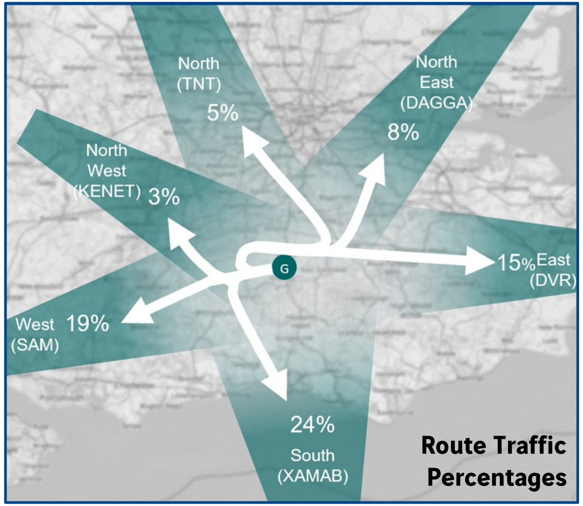


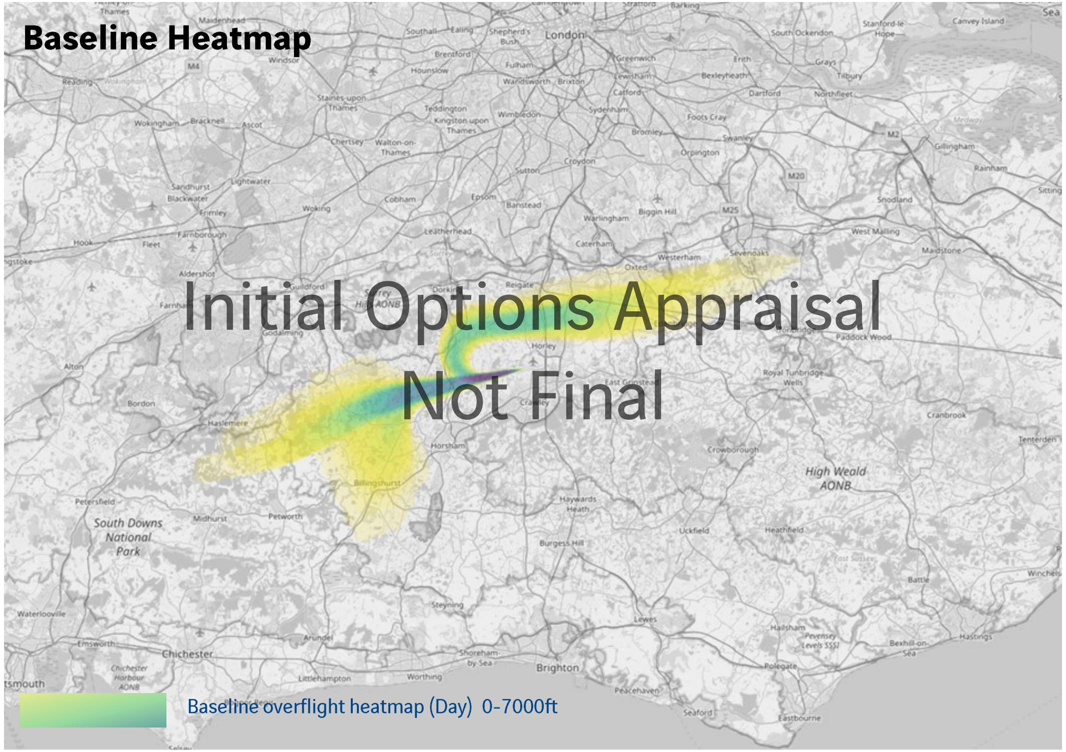


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly Baseline

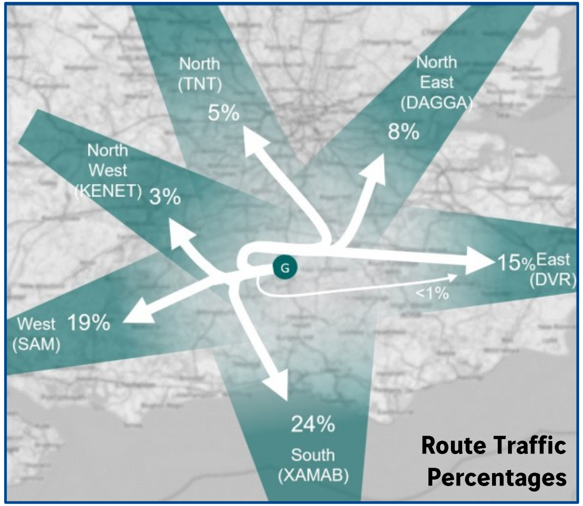




The options and any data shown in this document should not be considered final.

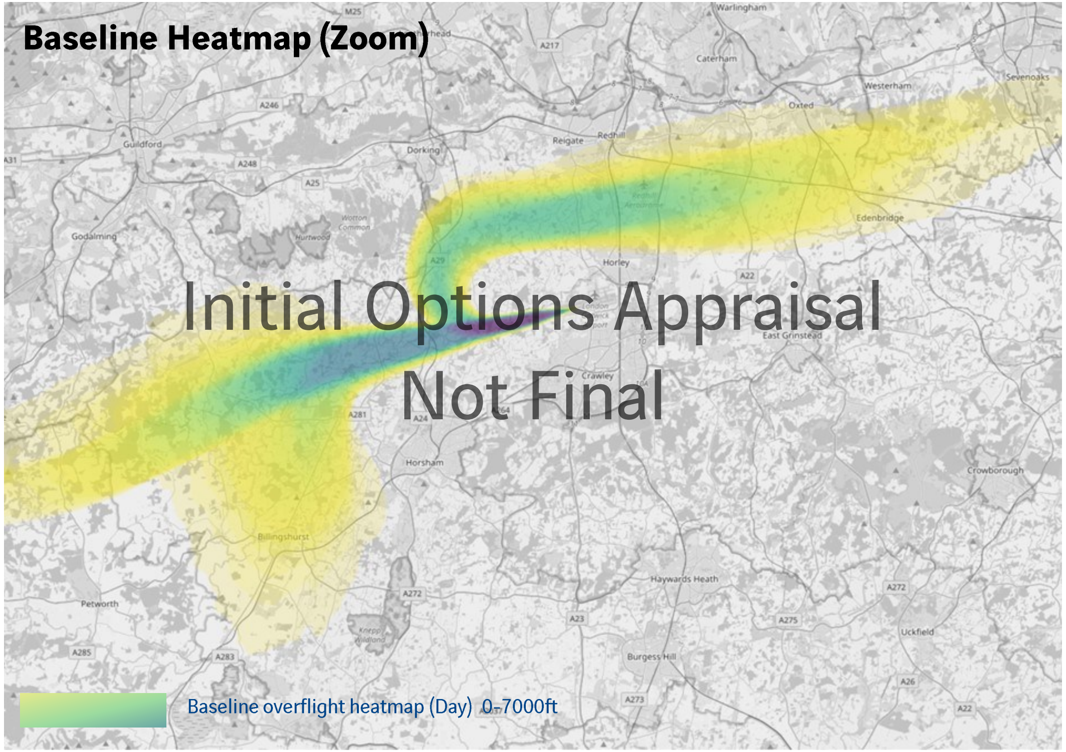
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly Baseline

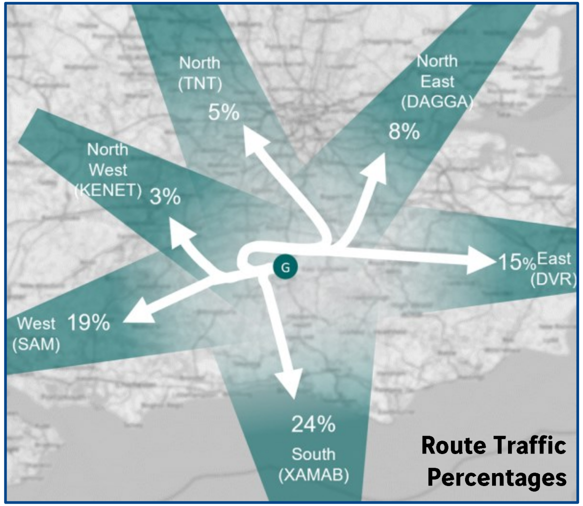


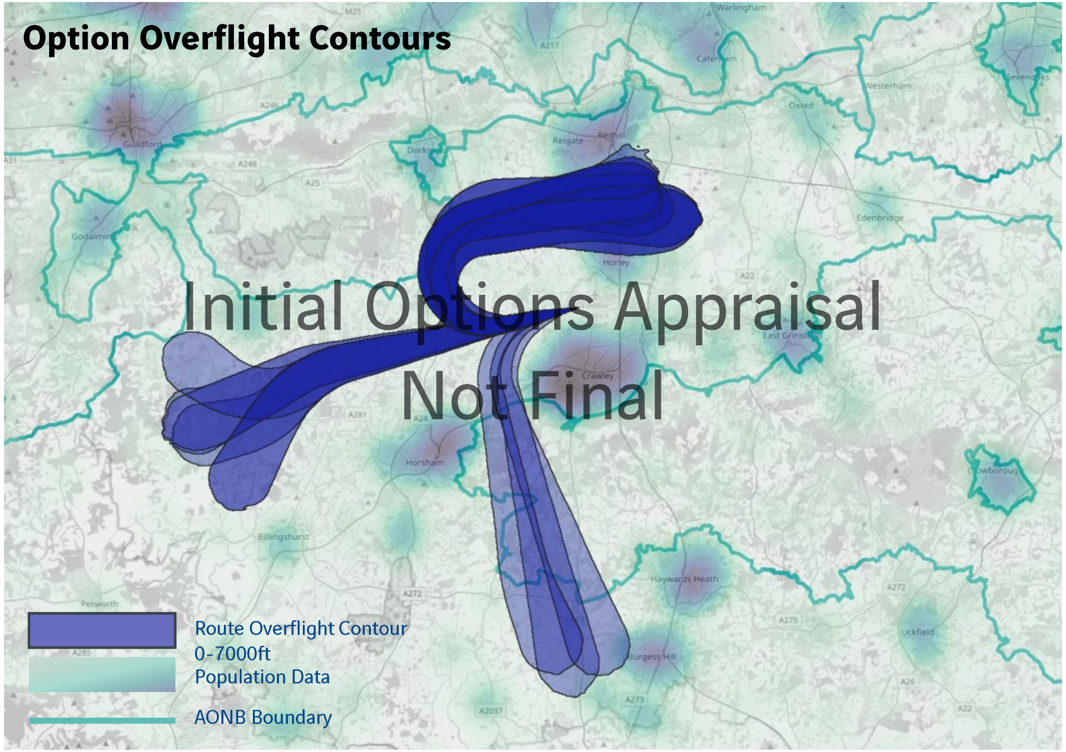
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Westerly System 1

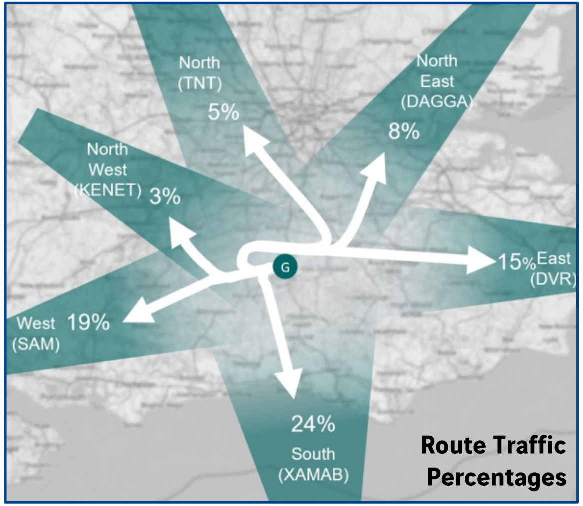


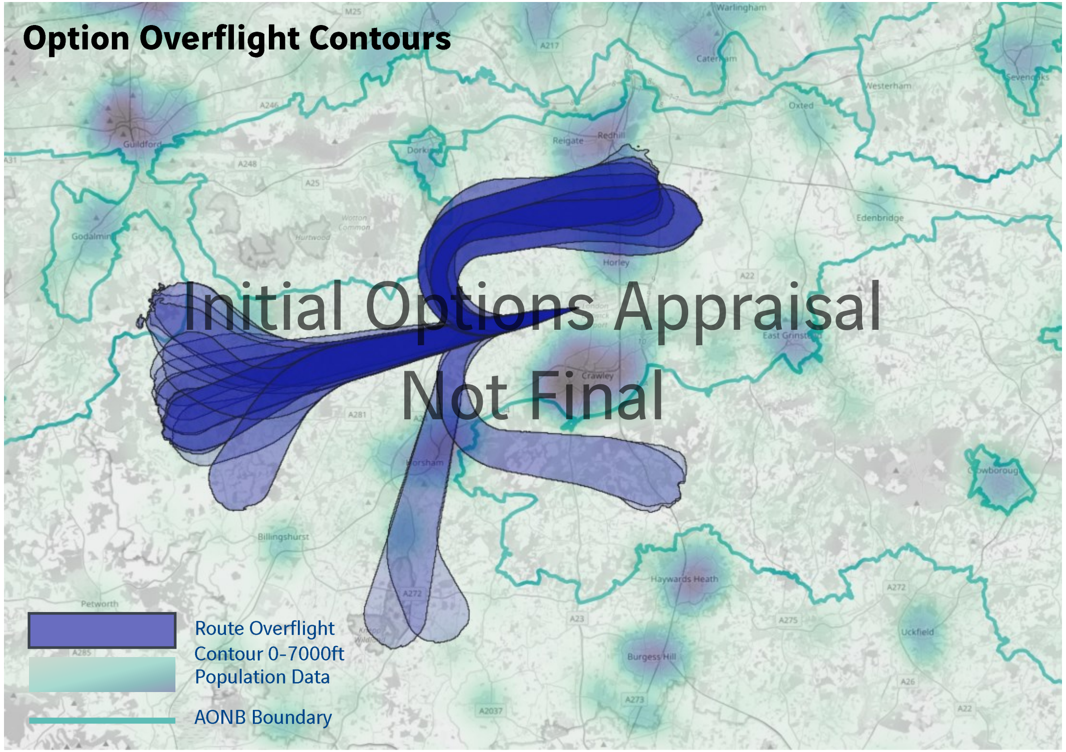


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly System 2

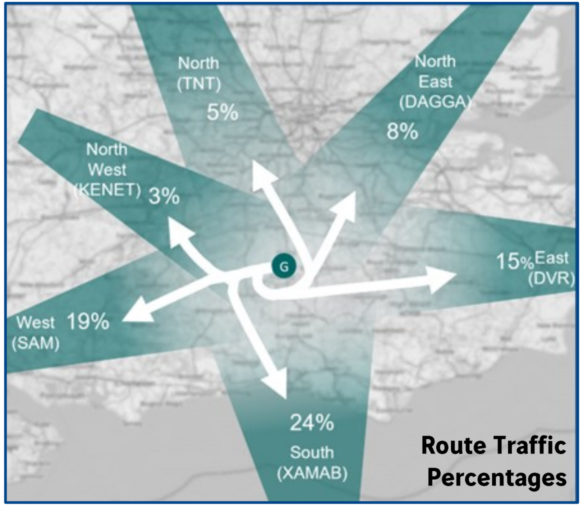




The options and any data shown in this document should not be considered final.

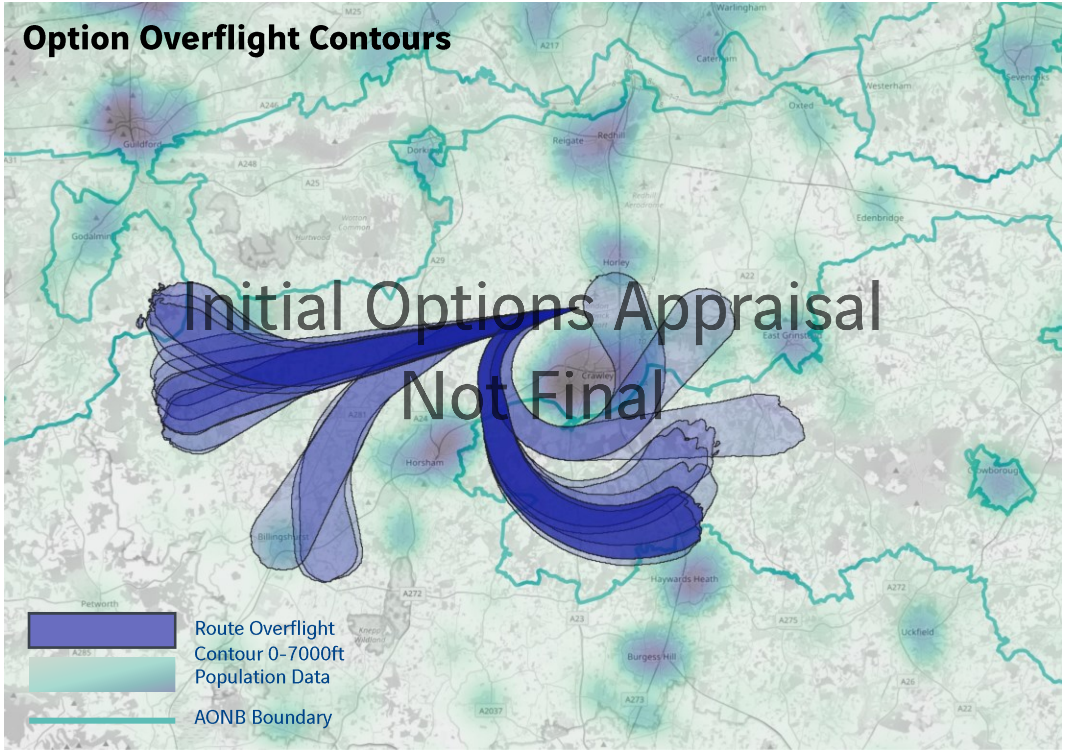
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly System 3

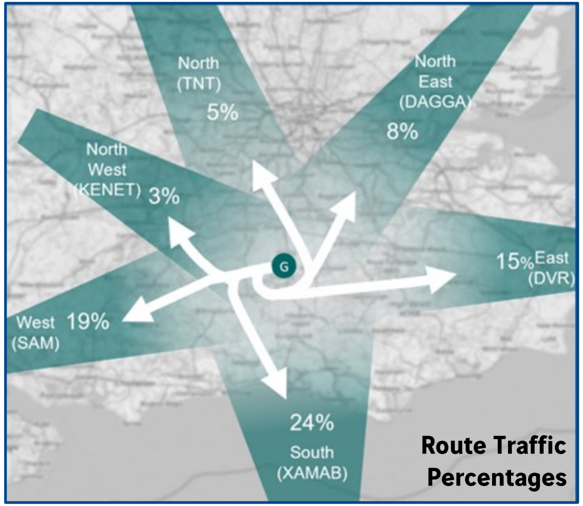


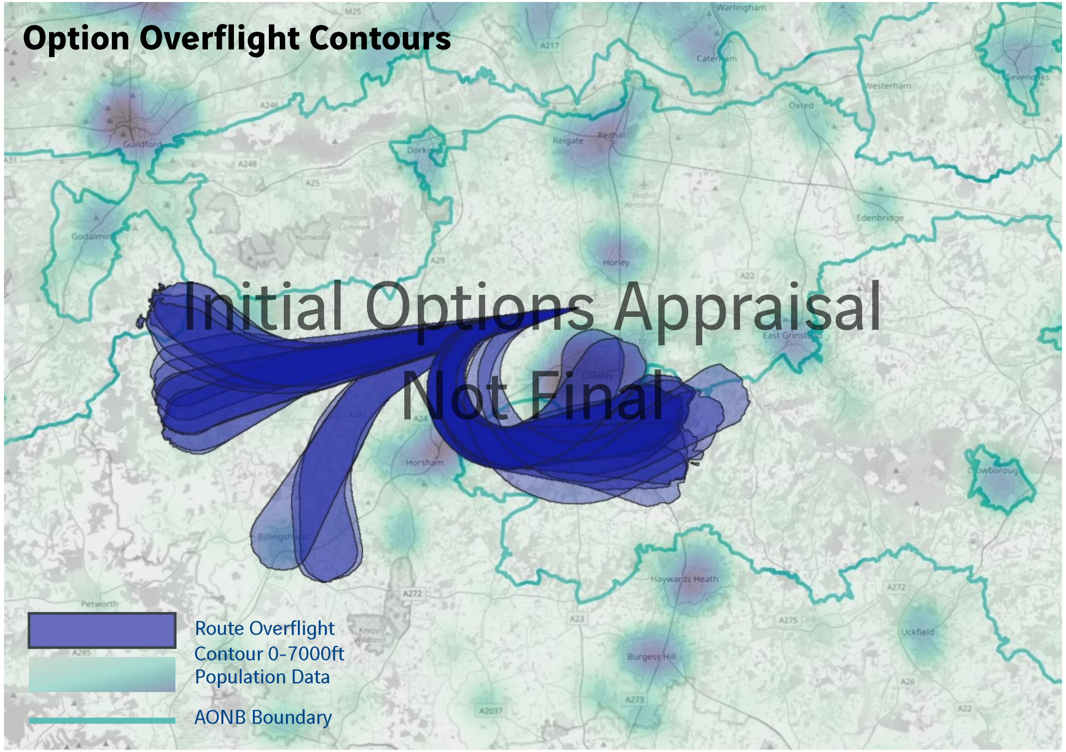
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Westerly System 4

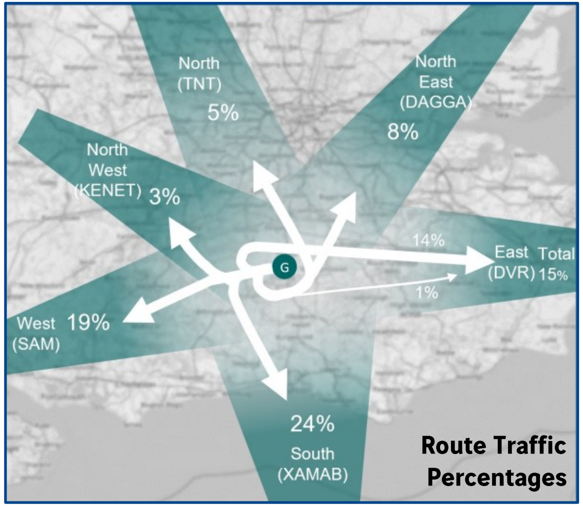




The options and any data shown in this document should not be considered final.

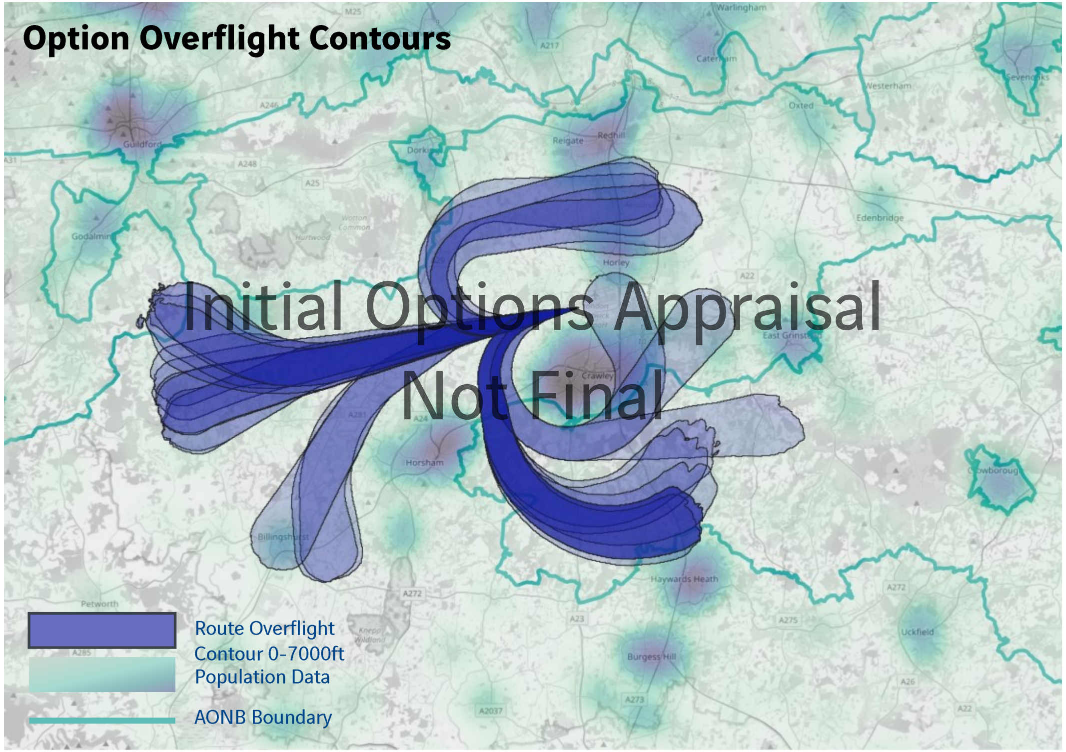
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly System 5 (Majority of DVR turn right)

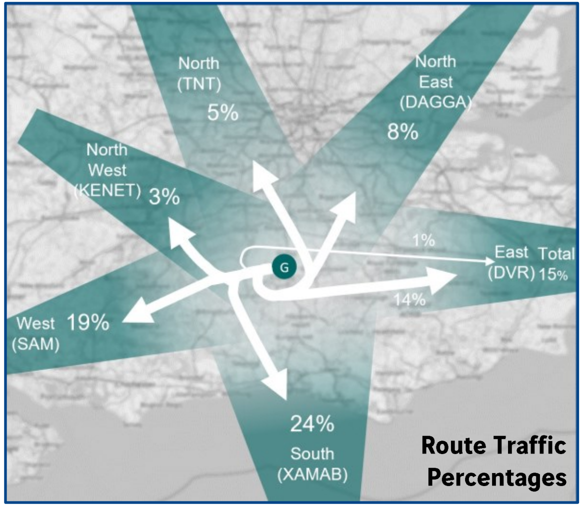


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

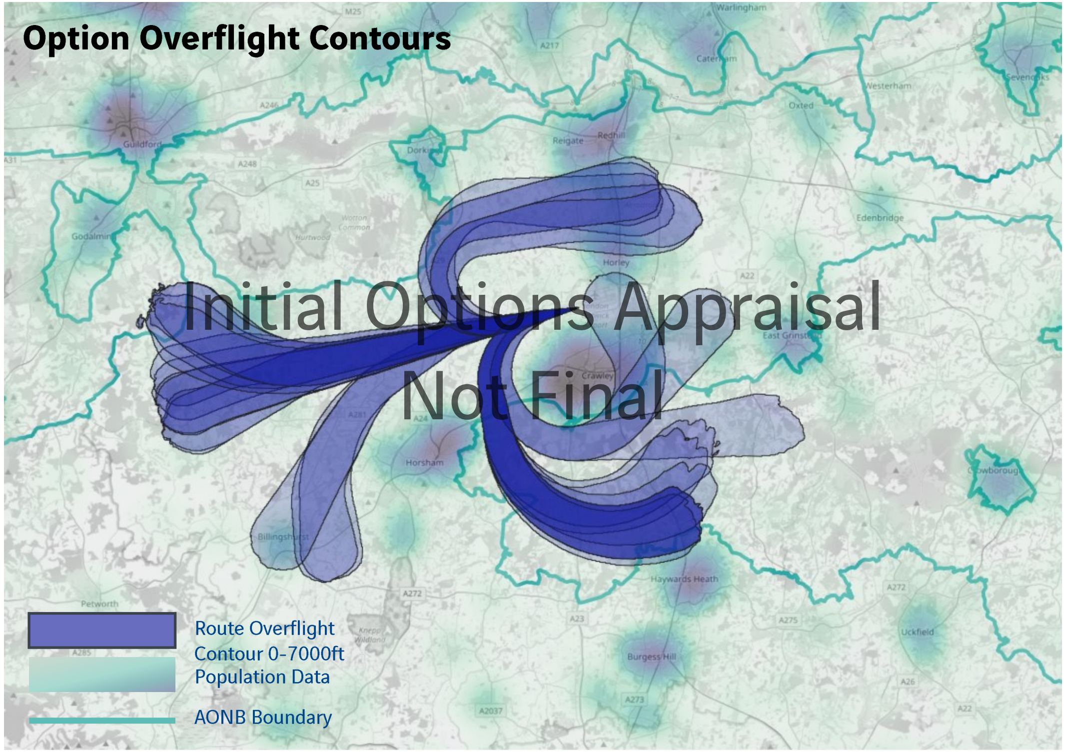


Westerly System 5 (Majority of DVR turn left)



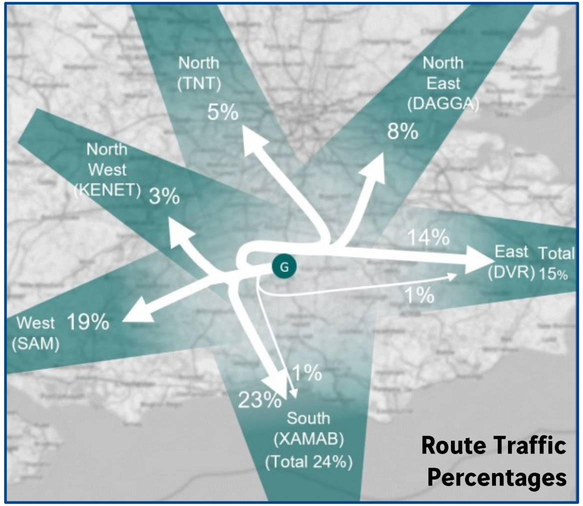
The options and any data shown in this document should not be considered final.

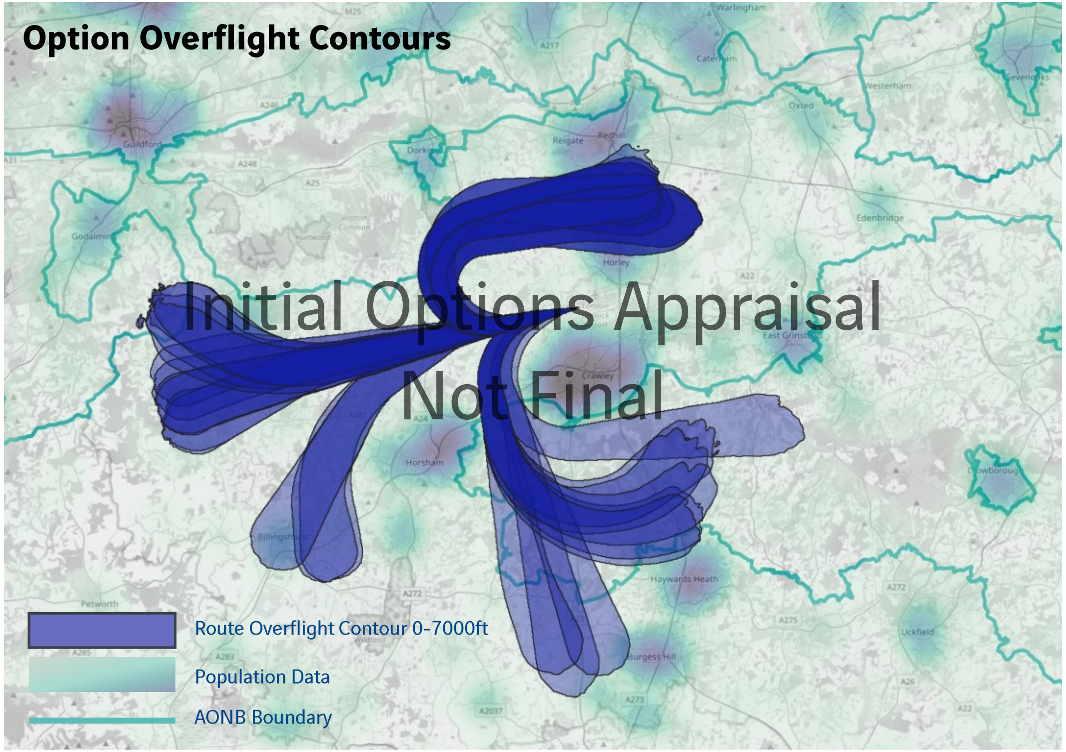
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



LONDON GATWICK

Westerly System 6 (Majority of DVR turn right)

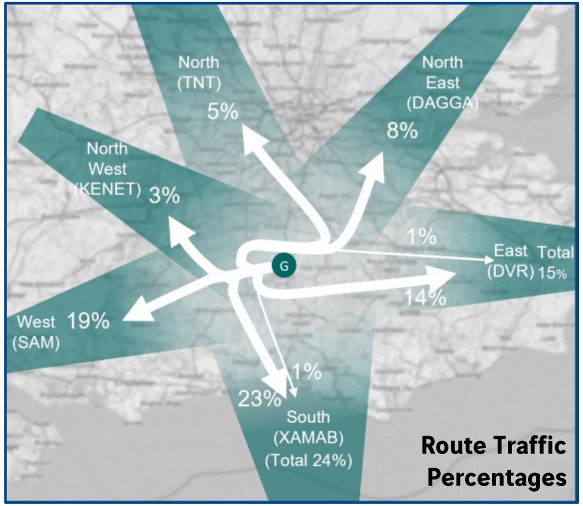


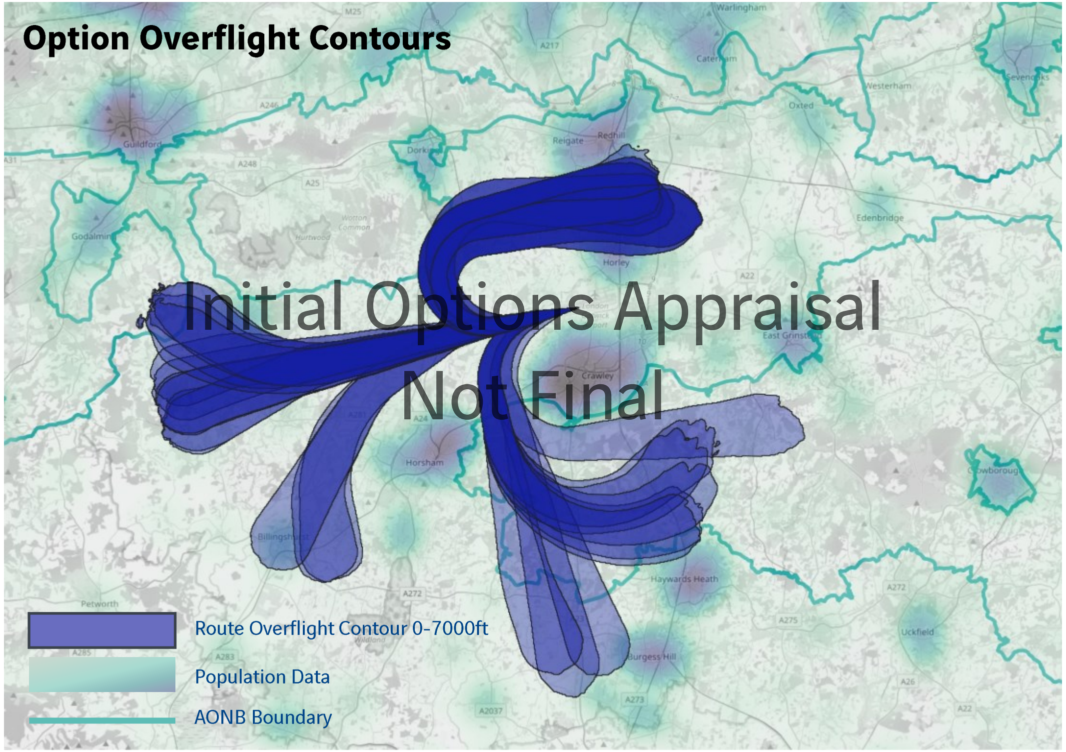


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly System 6 (Majority of DVR turn left)

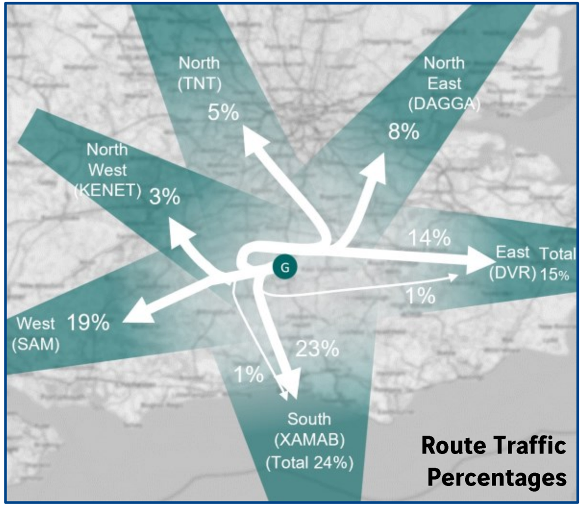




The options and any data shown in this document should not be considered final.

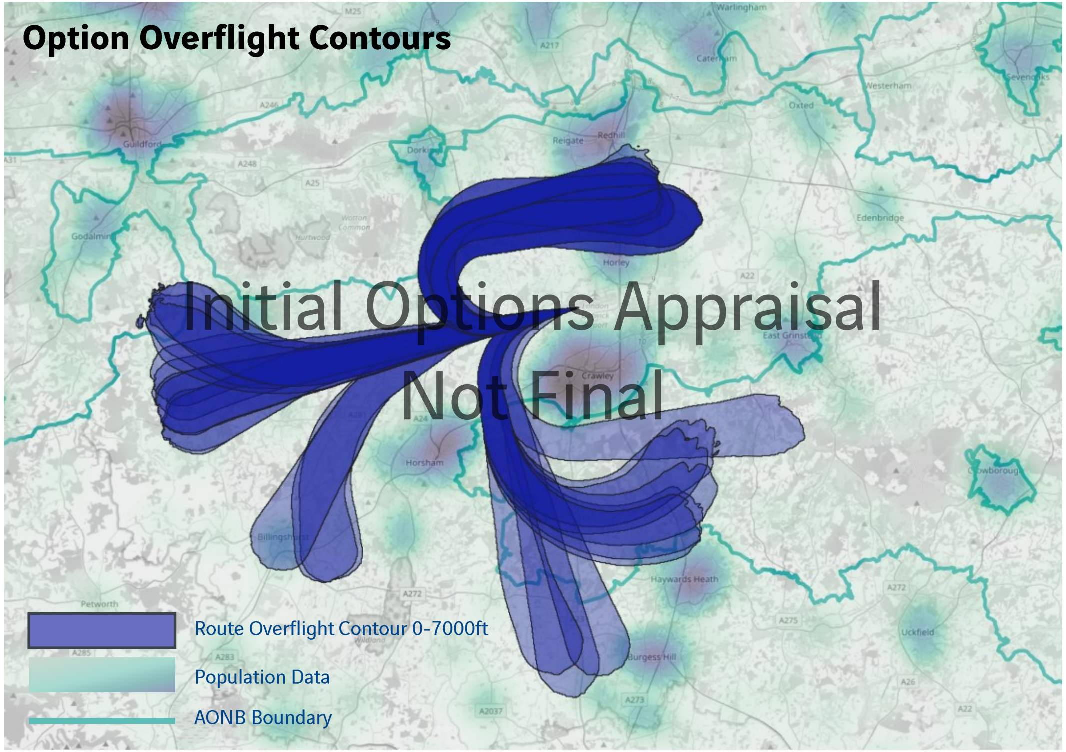
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly System 6 (XAM immediate left, DVR right)

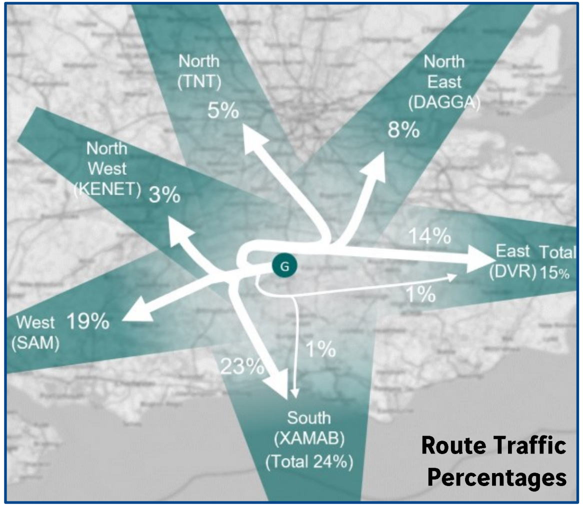


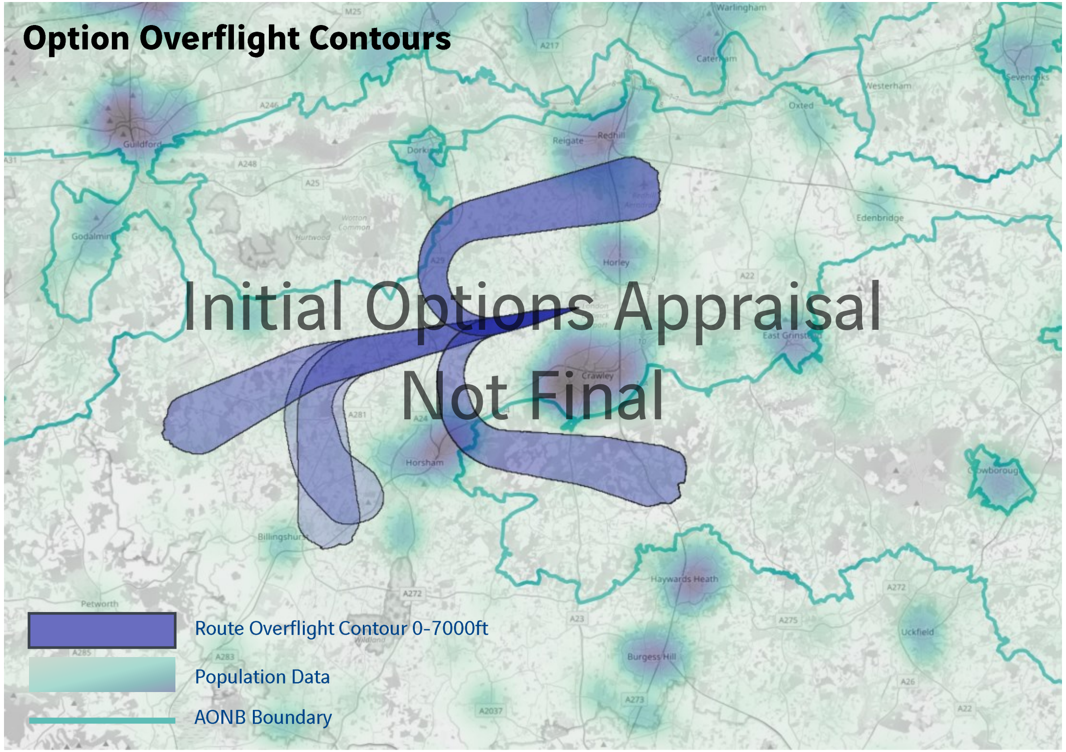
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Westerly System 7 (Majority of DVR turn right)

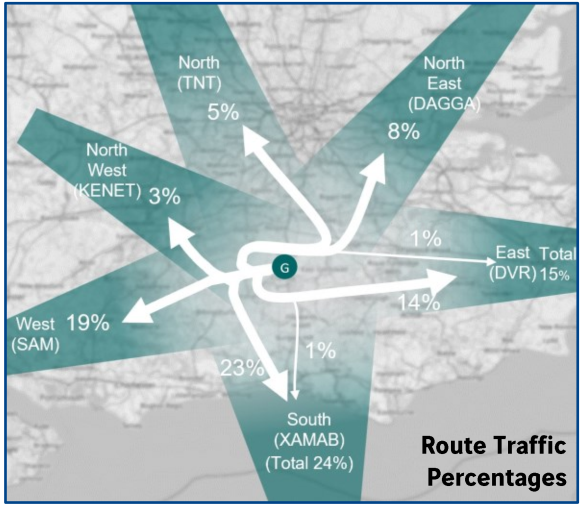




The options and any data shown in this document should not be considered final.

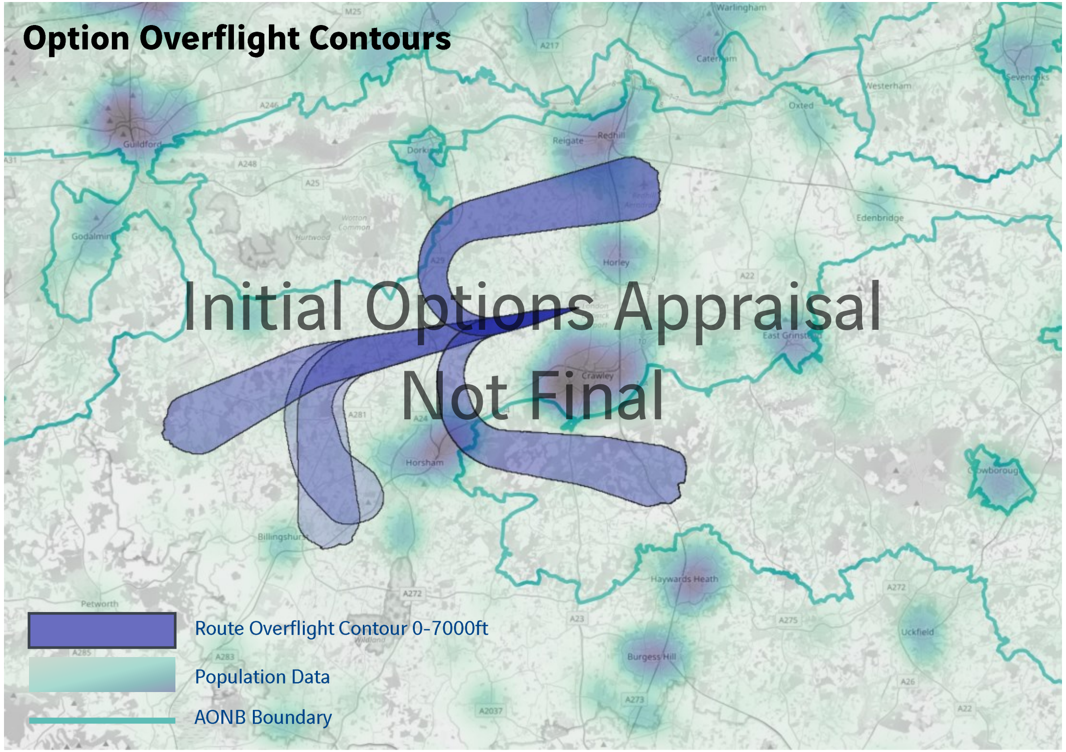
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly System 7 (Majority of DVR turn left)

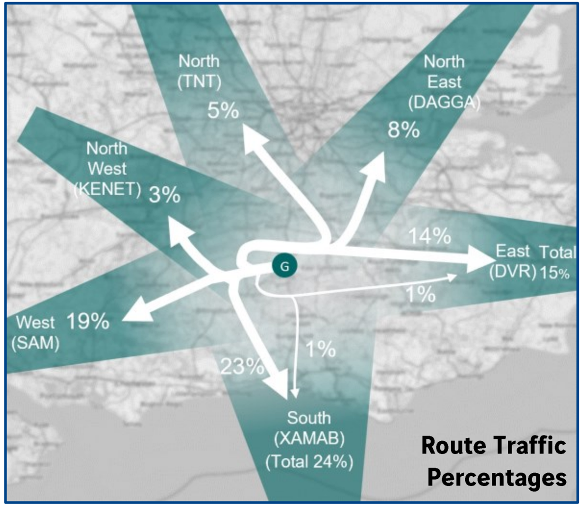


The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

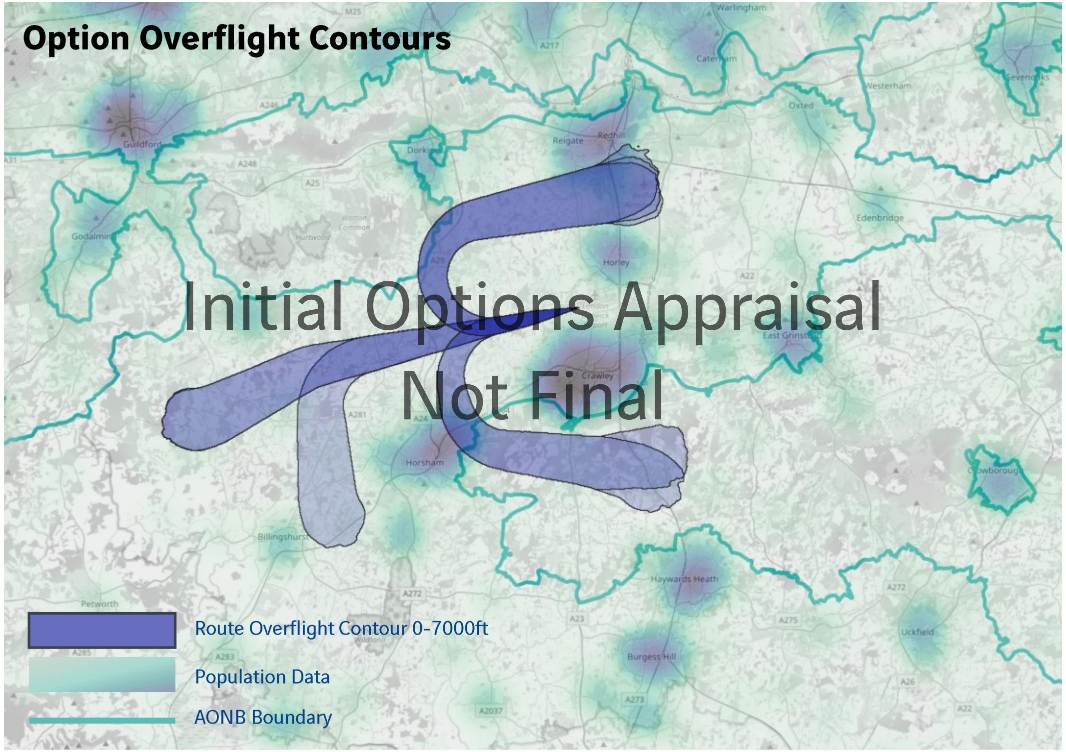


Westerly System 8 (Majority of DVR turn right)

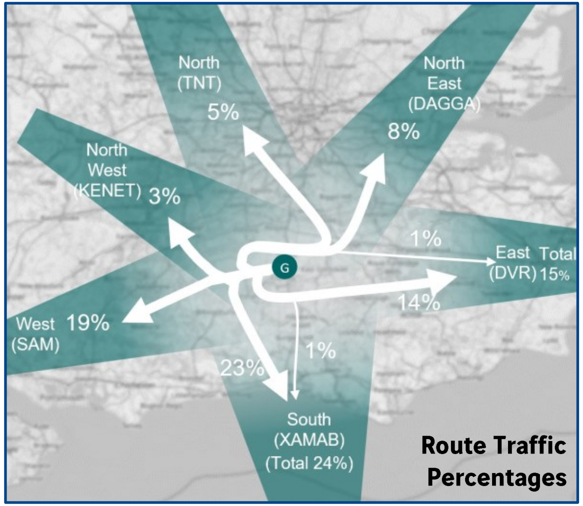


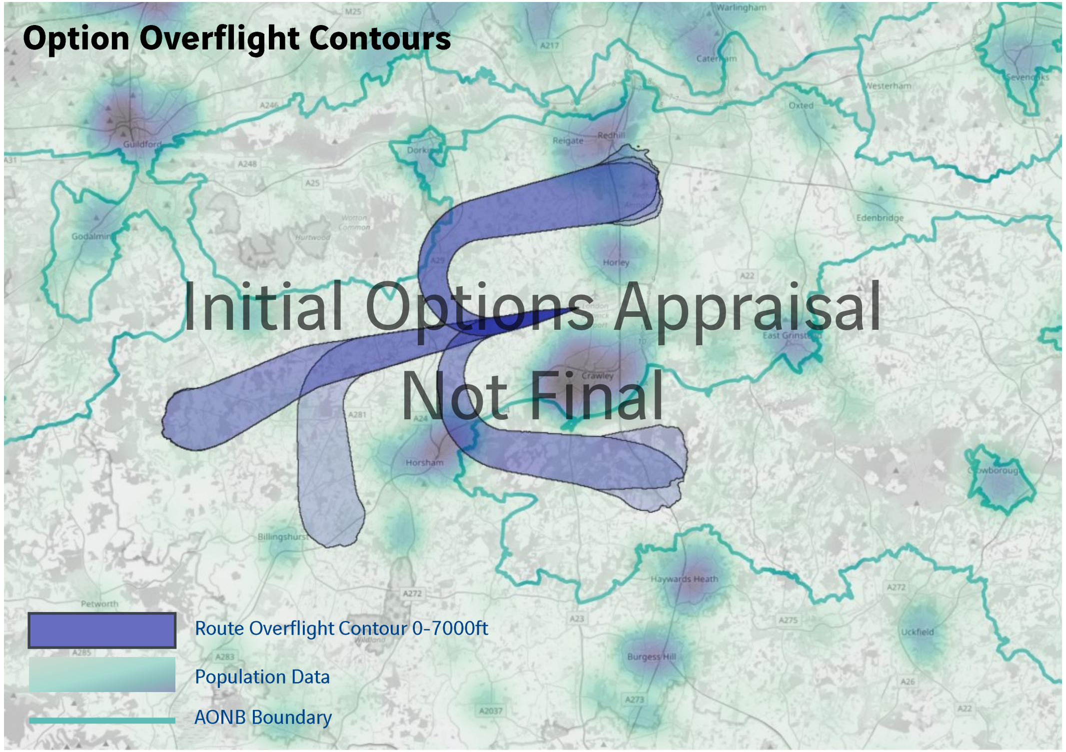
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



Westerly System 8 (Majority of DVR turn left)





The options and any data shown in this document should not be considered final.

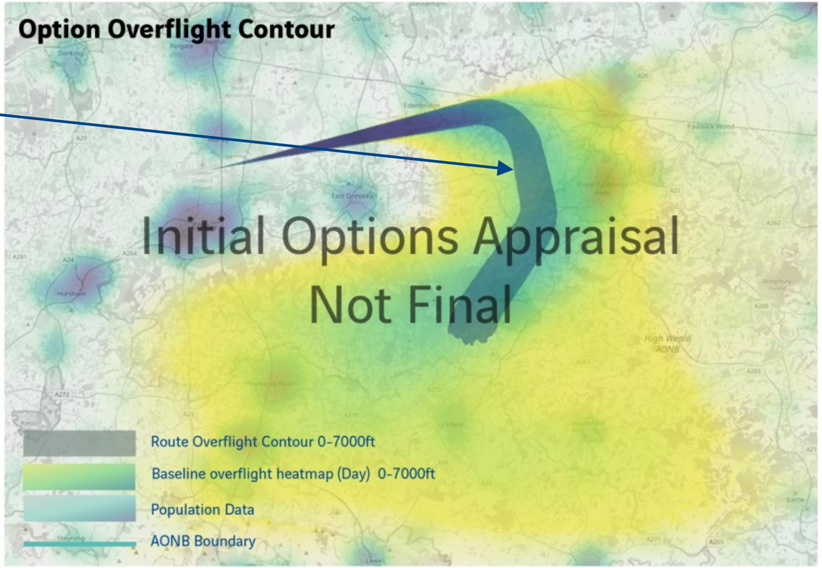
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Arrivals

Understanding the options: Arrivals

The images of the arrival options (other than the Radar Maneuvering Area (RMA)) show a PBN route centerline between 7000ft to landing based on a standard 3º continuous descent.

It's important to note that, at the point of implementation, it is anticipated the technology required from the network airspace above 7000ft to operate solely PBN arrivals will not be available, and therefore we expect there will be a necessity for some tactical controlling (vectoring) of aircraft particularly during peak periods alongside the operation of PBN arrival options.

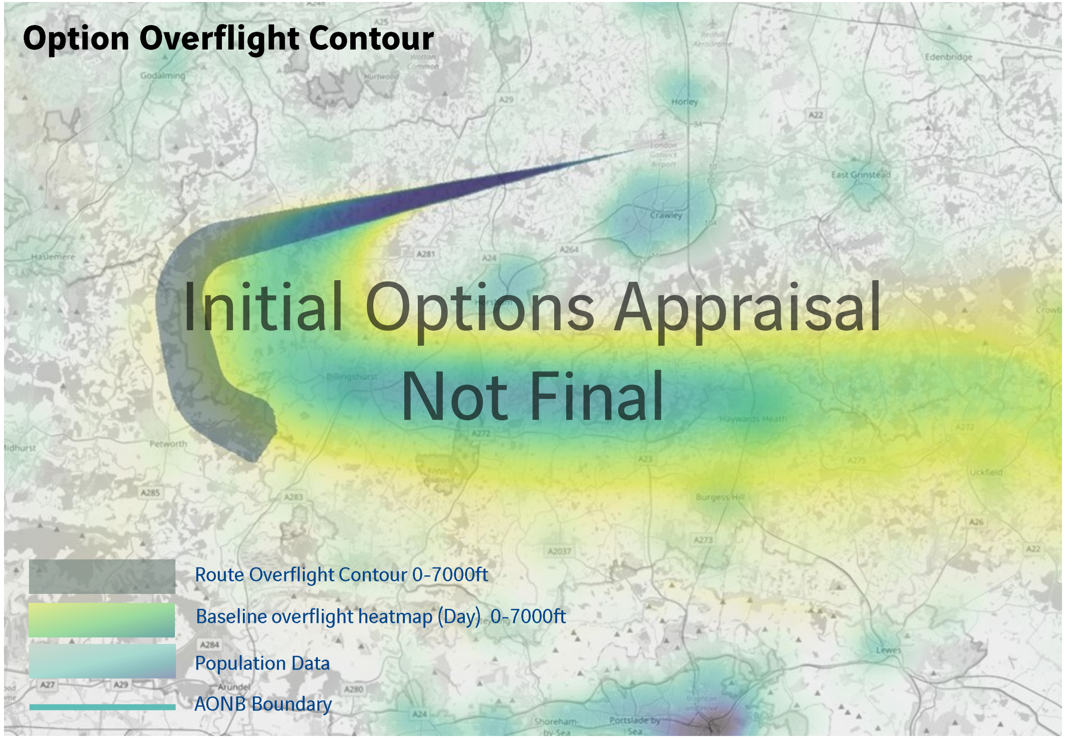


The image details the option overflight contours from 0-7000ft based on the CAA's CAP1498 48.5º definition of overflight. The option contour is shown against a 'do nothing' baseline heatmap.

The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

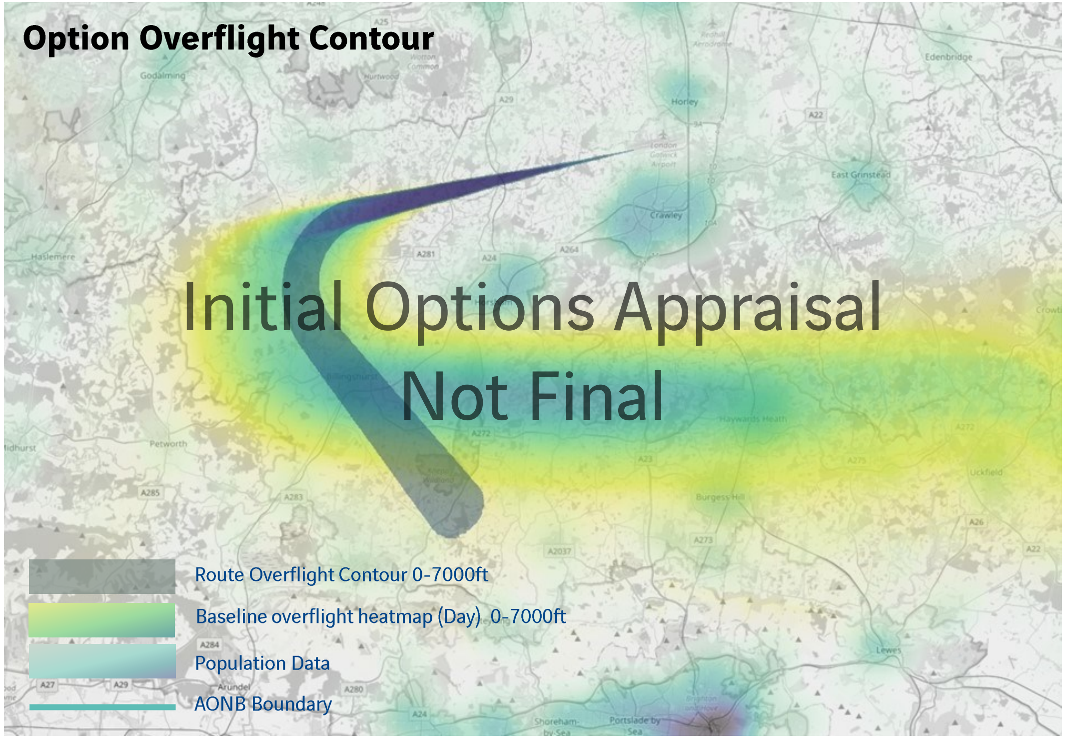
Easterly Arrivals: EAA



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

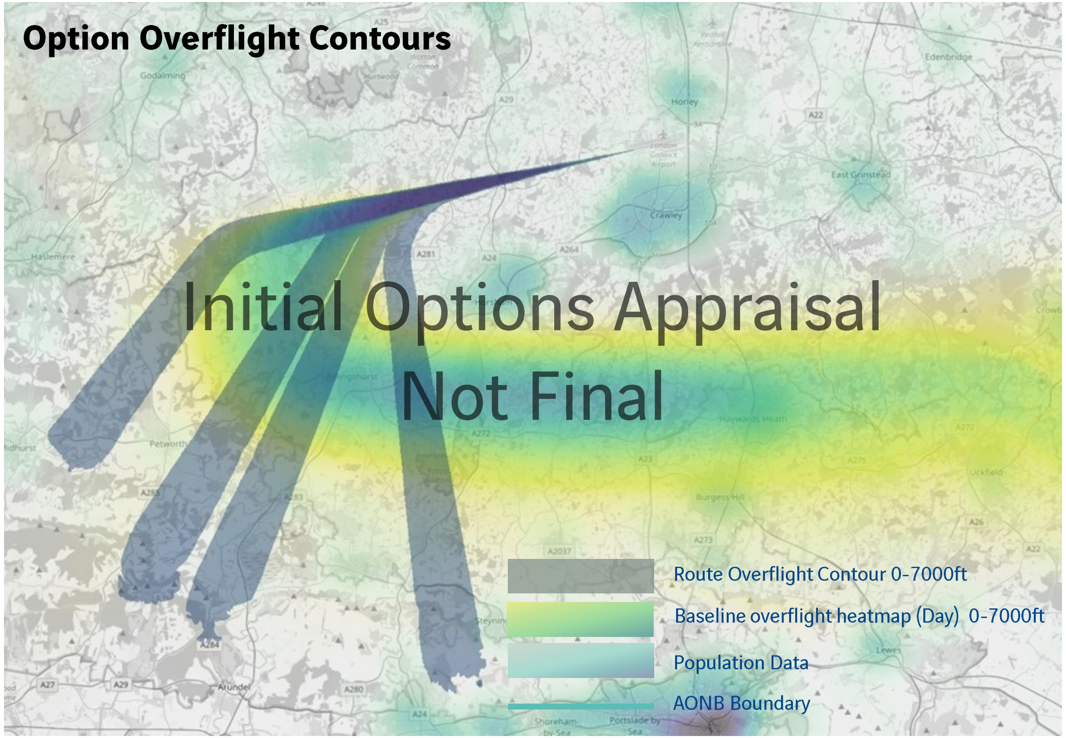
Easterly Arrivals: EAC



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

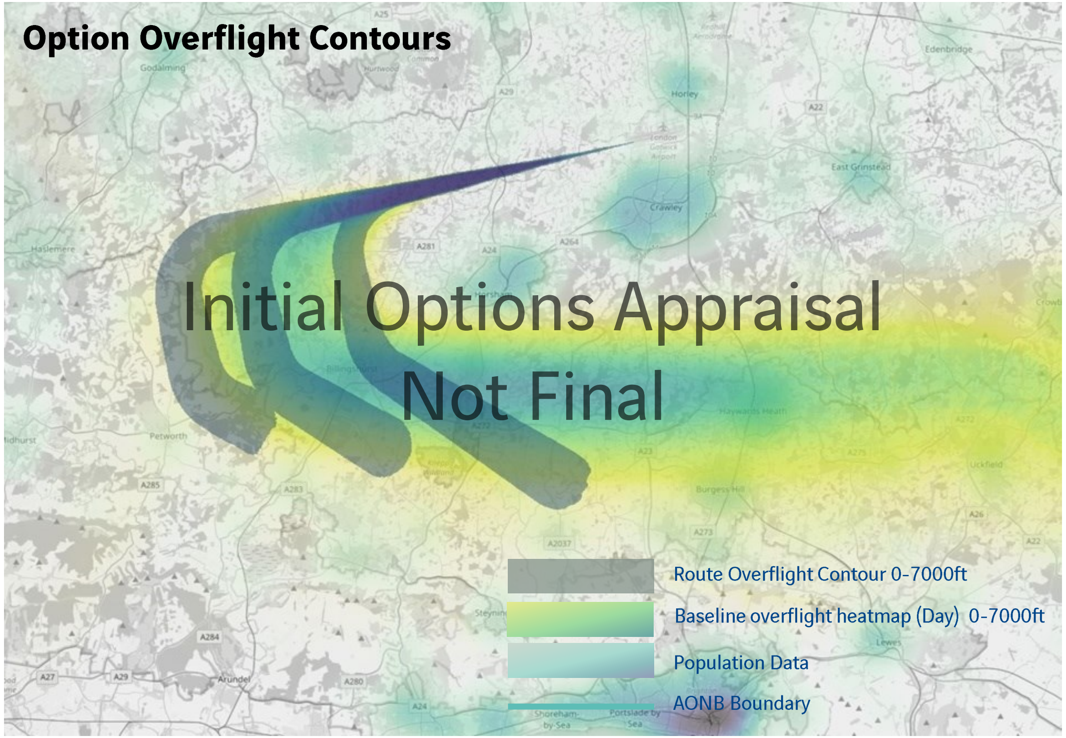
Easterly Arrivals: EAD



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

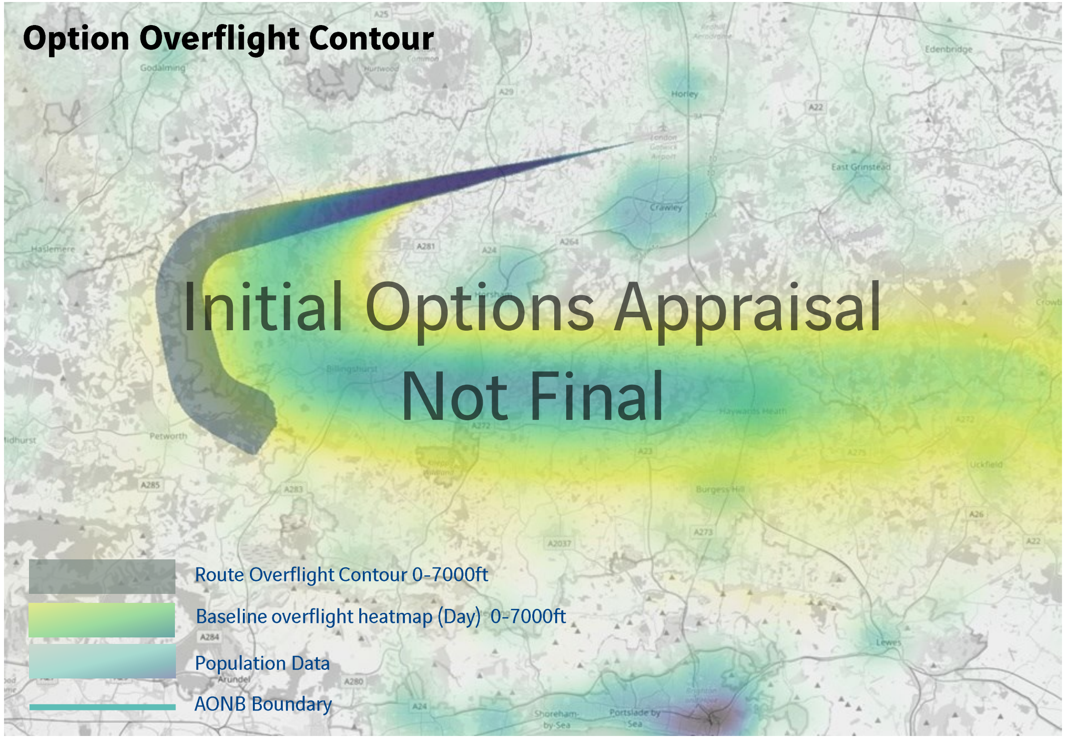
Easterly Arrivals: EAE



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

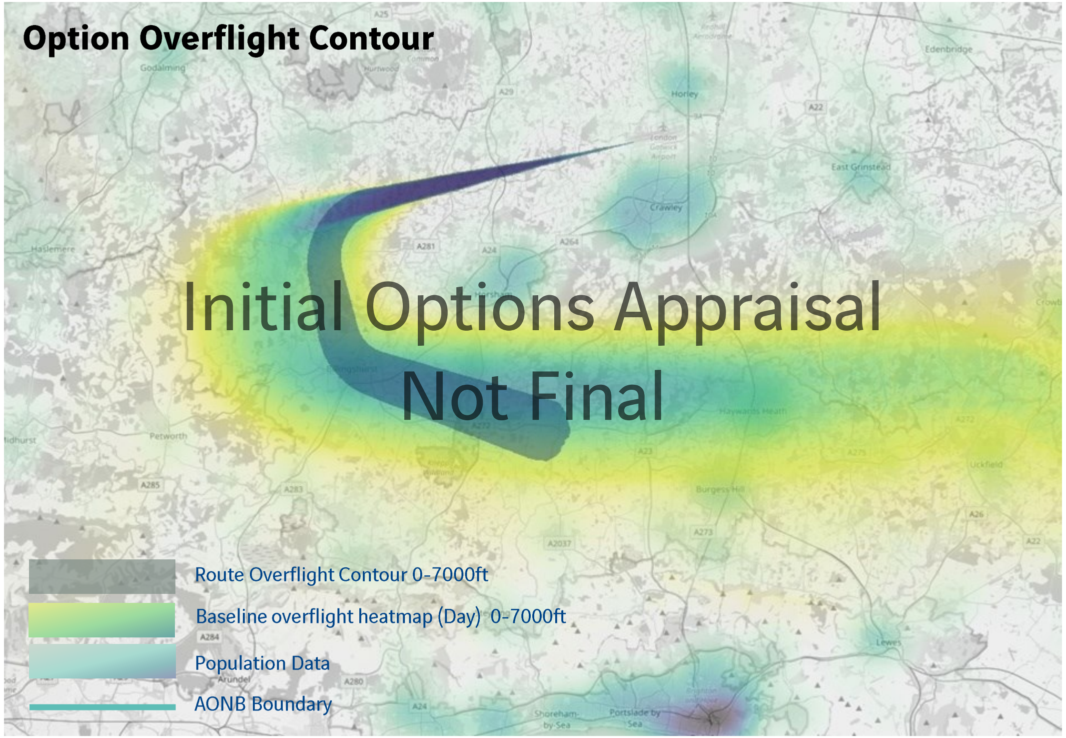
Easterly Arrivals: EAF



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

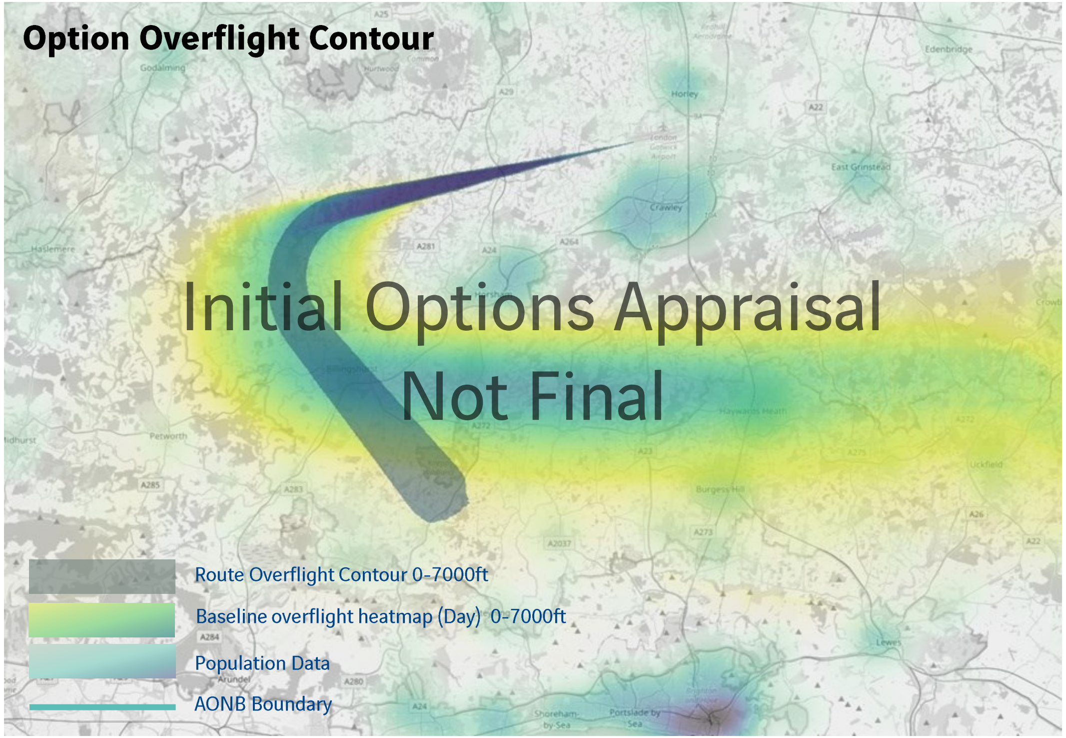
Easterly Arrivals: EAG



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

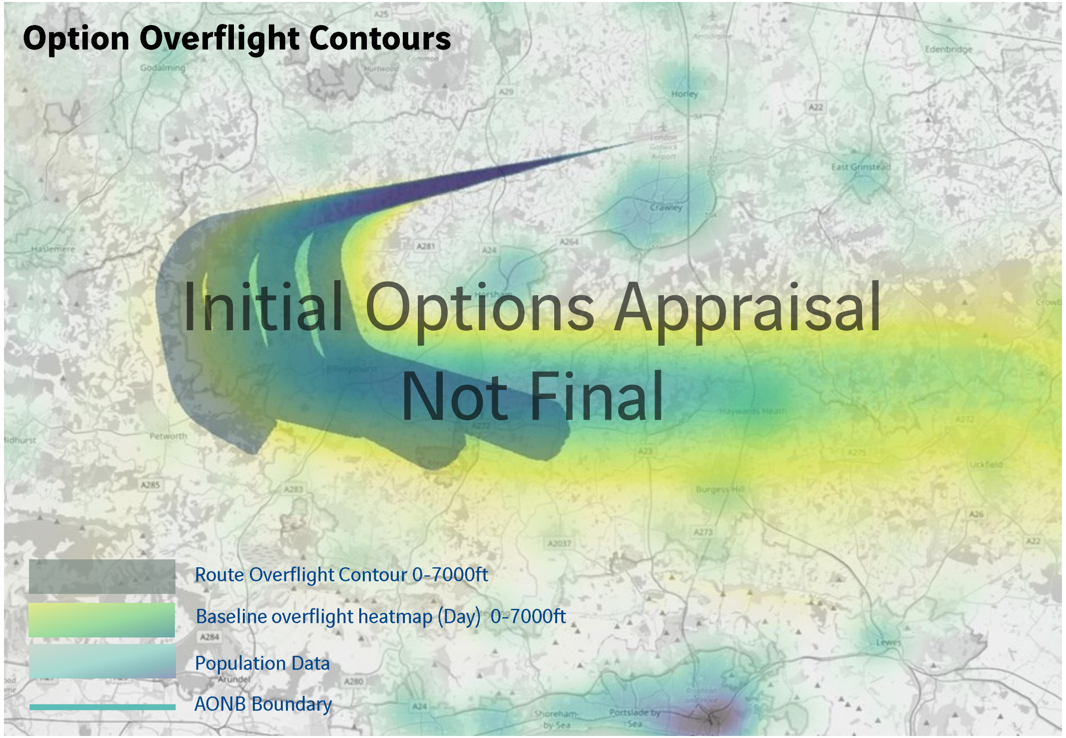
Easterly Arrivals: EAI



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

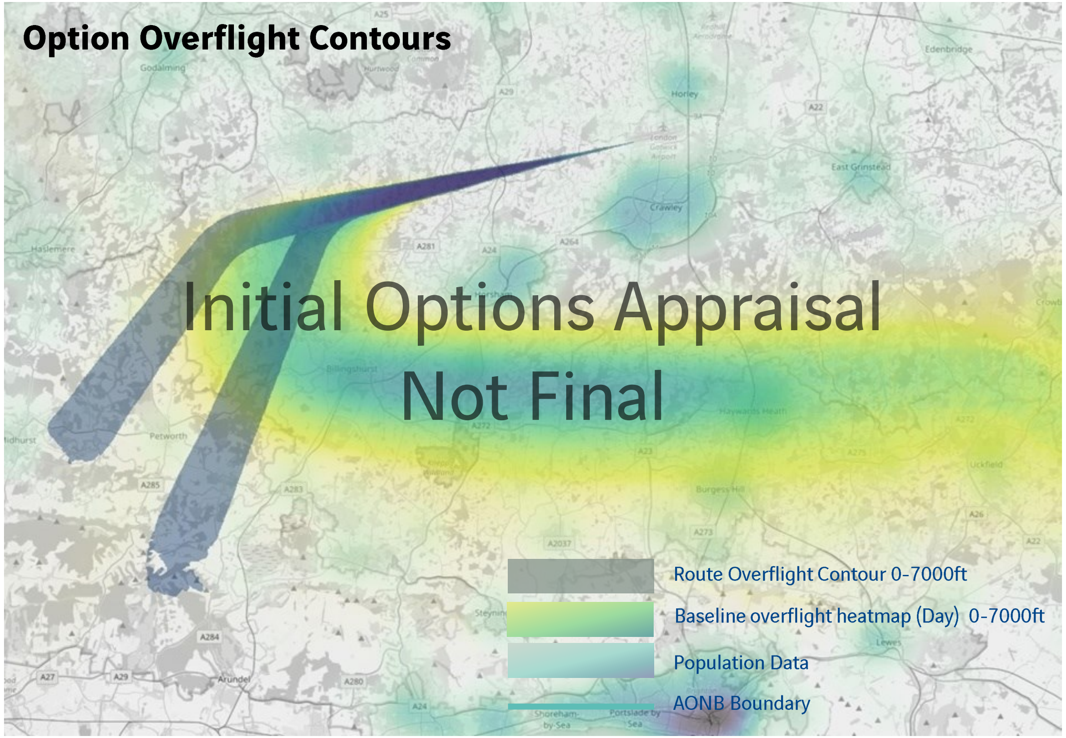
Easterly Arrivals: EAJ



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

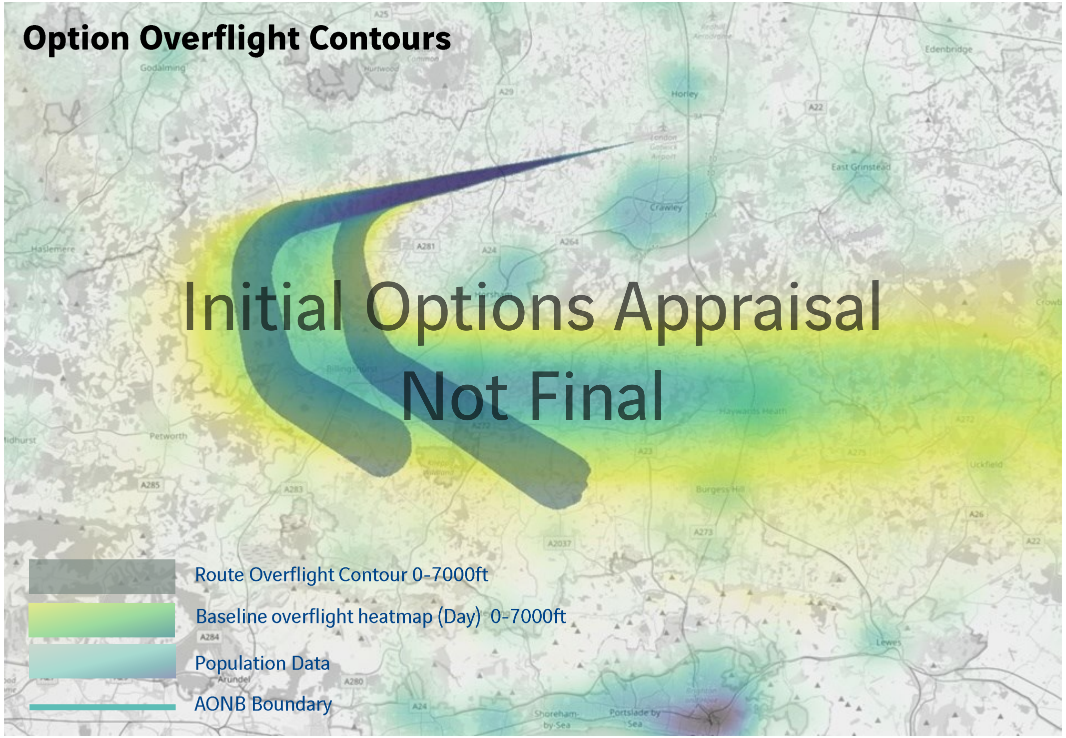
Easterly Arrivals: EAK



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

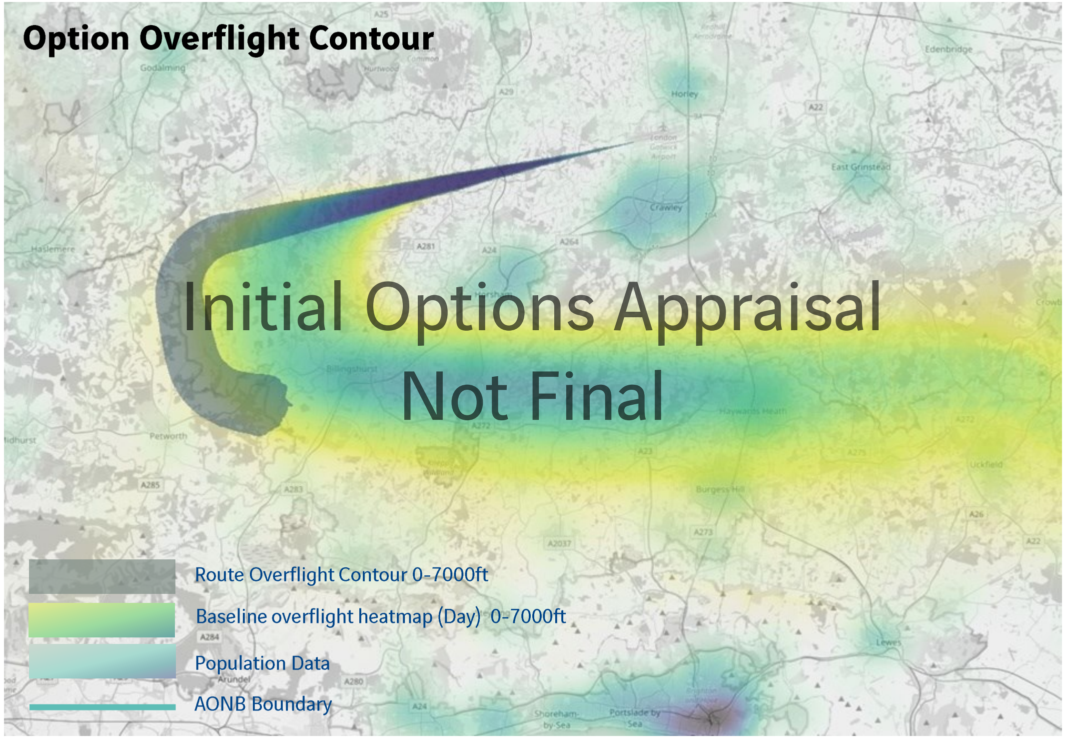
Easterly Arrivals: EAL



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

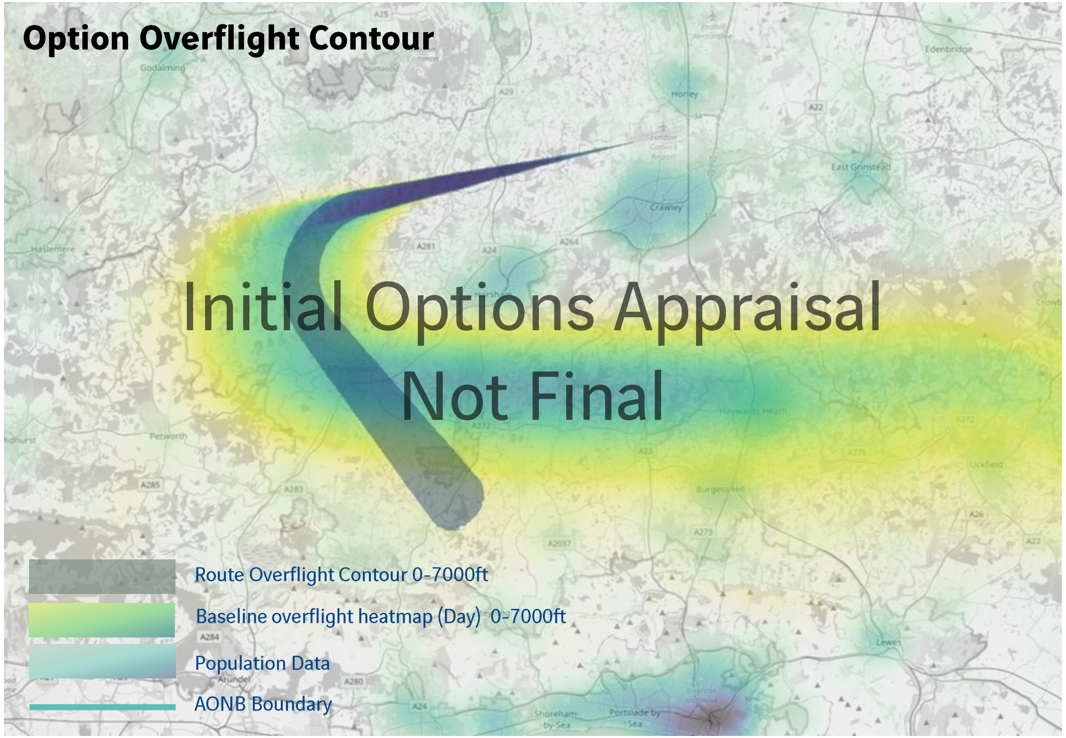
Easterly Arrivals: EAM



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

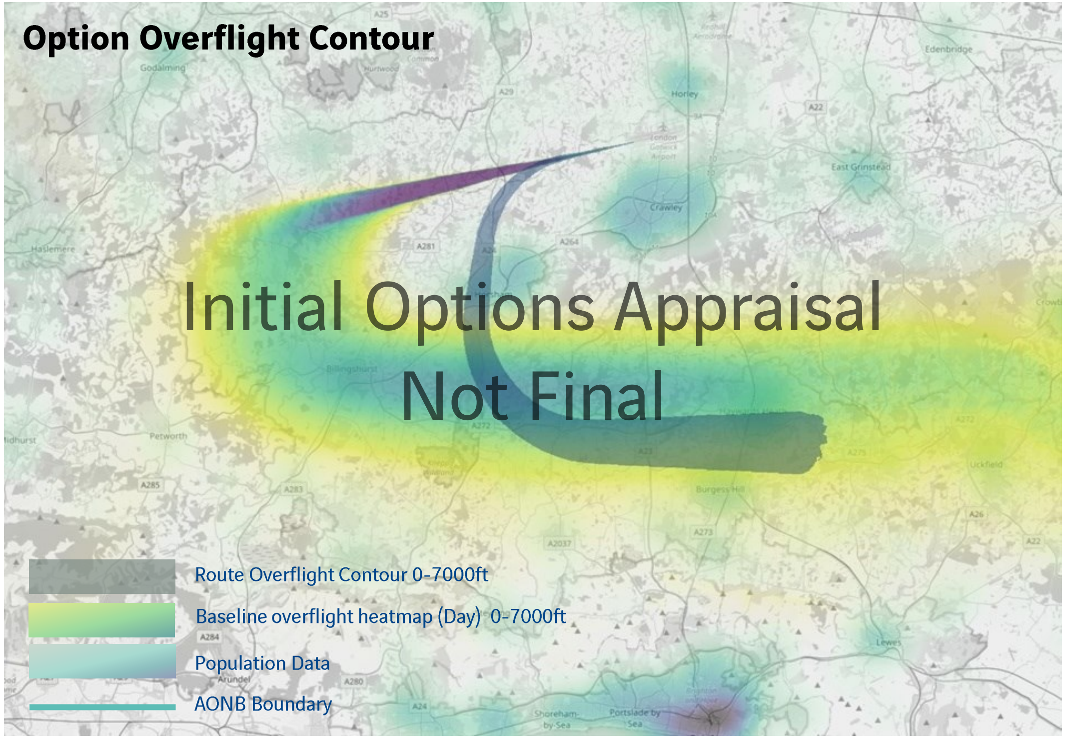
Easterly Arrivals: EAN



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

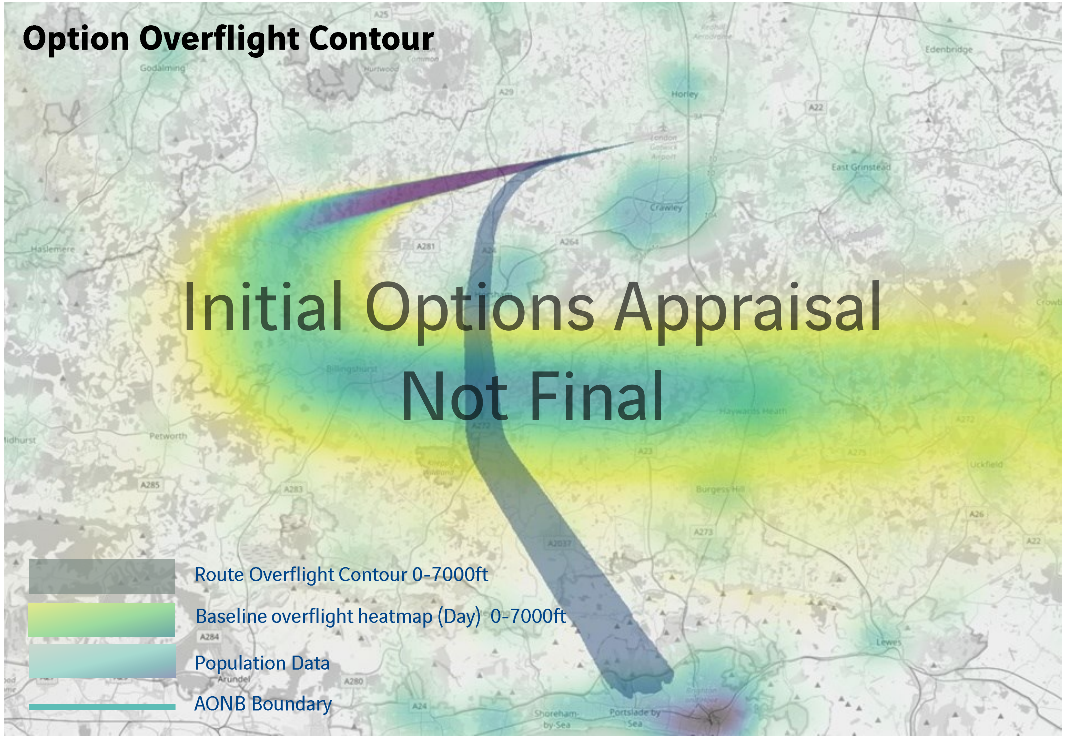
Easterly Arrivals: EAO



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

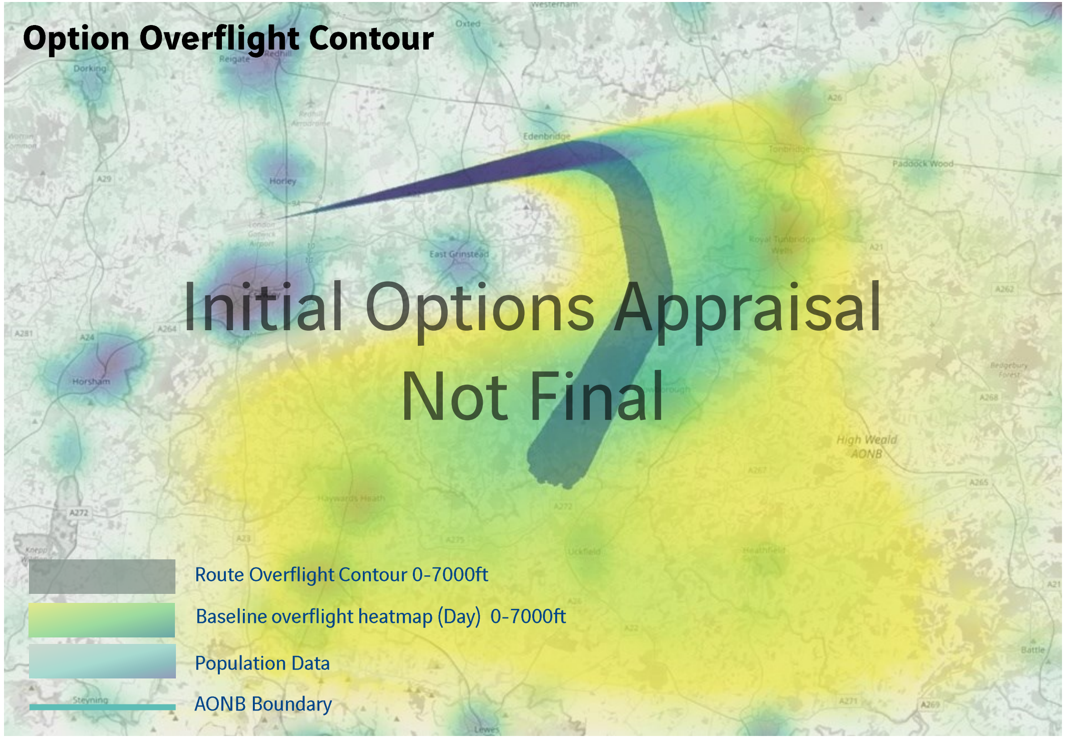
Easterly Arrivals: EAP



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

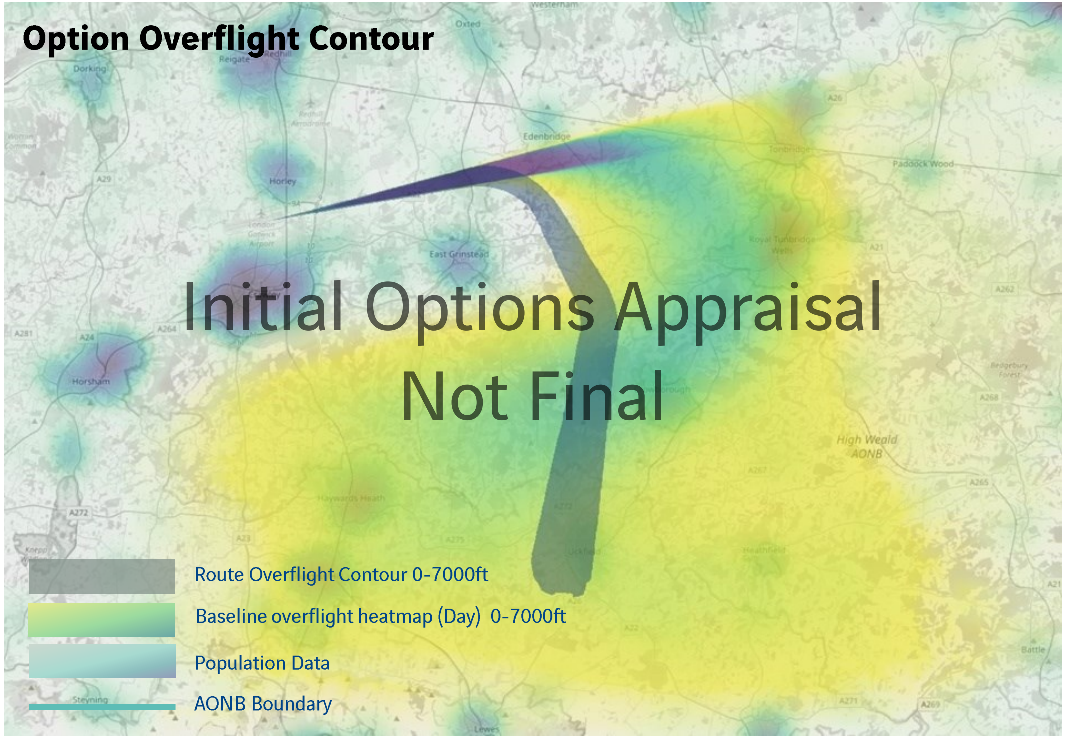
Westerly Arrivals: WAA



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

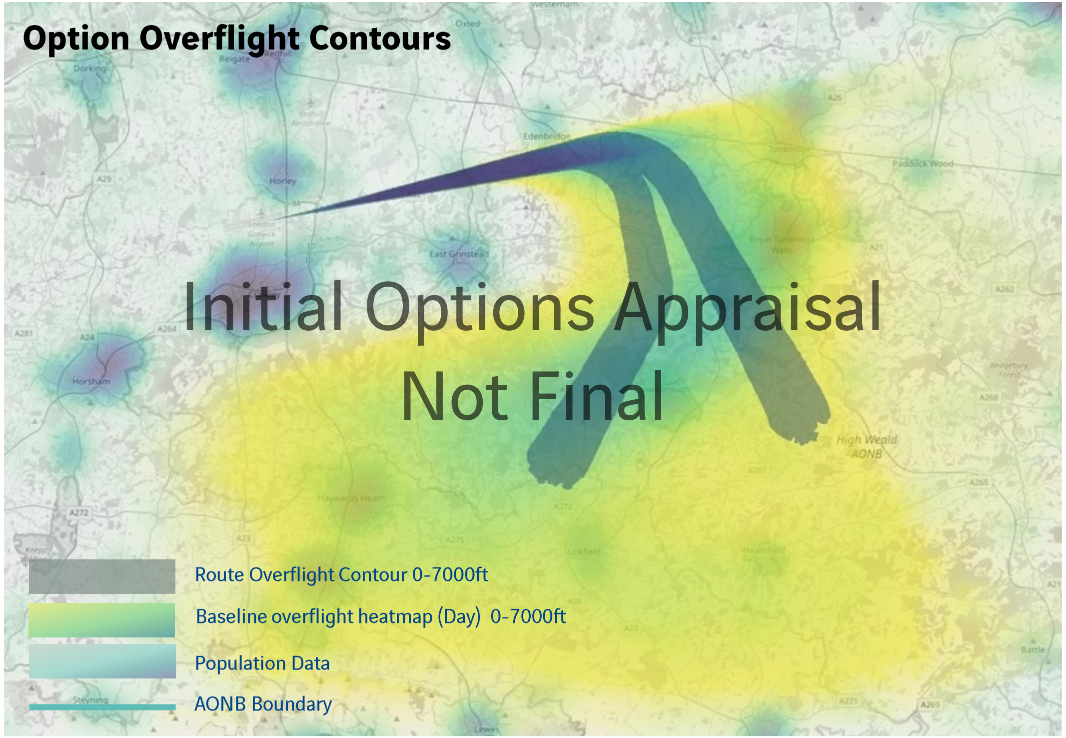
Westerly Arrivals: WAC



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

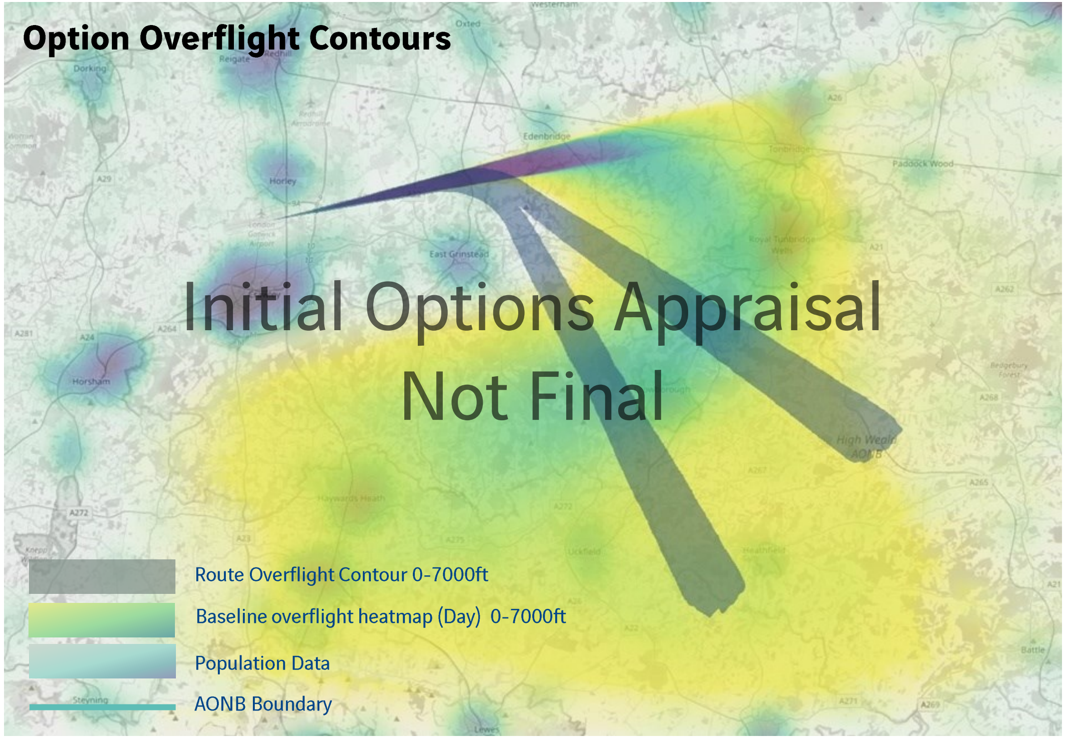
Westerly Arrivals: WAD



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

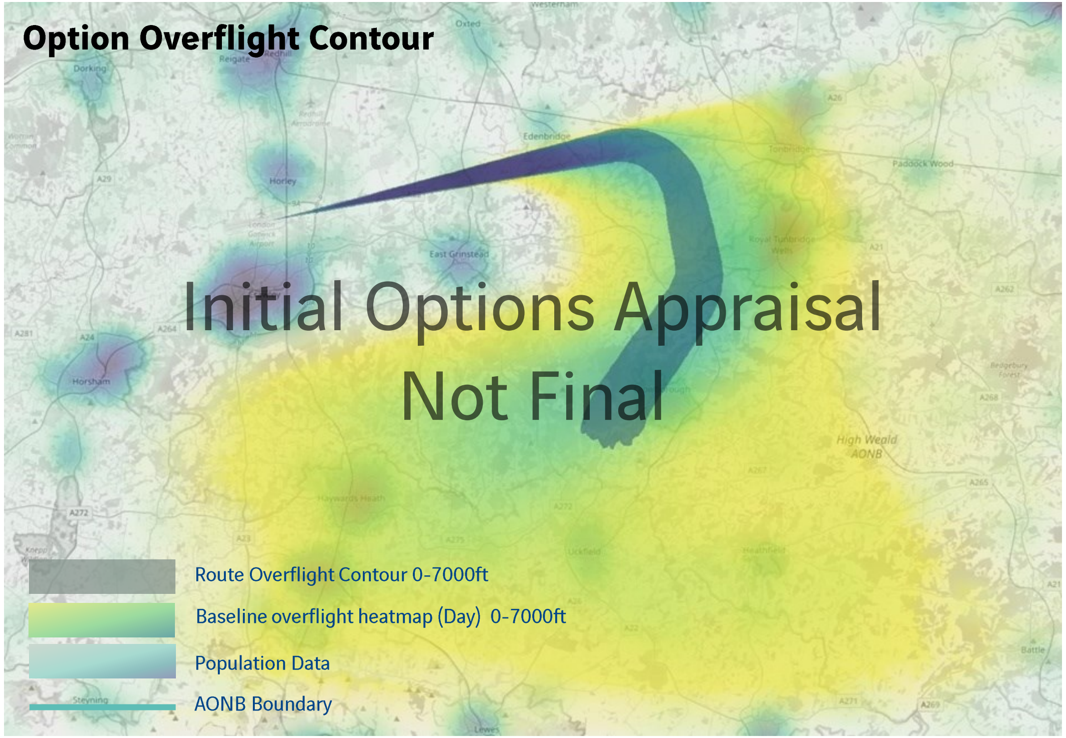
Westerly Arrivals: WAE



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

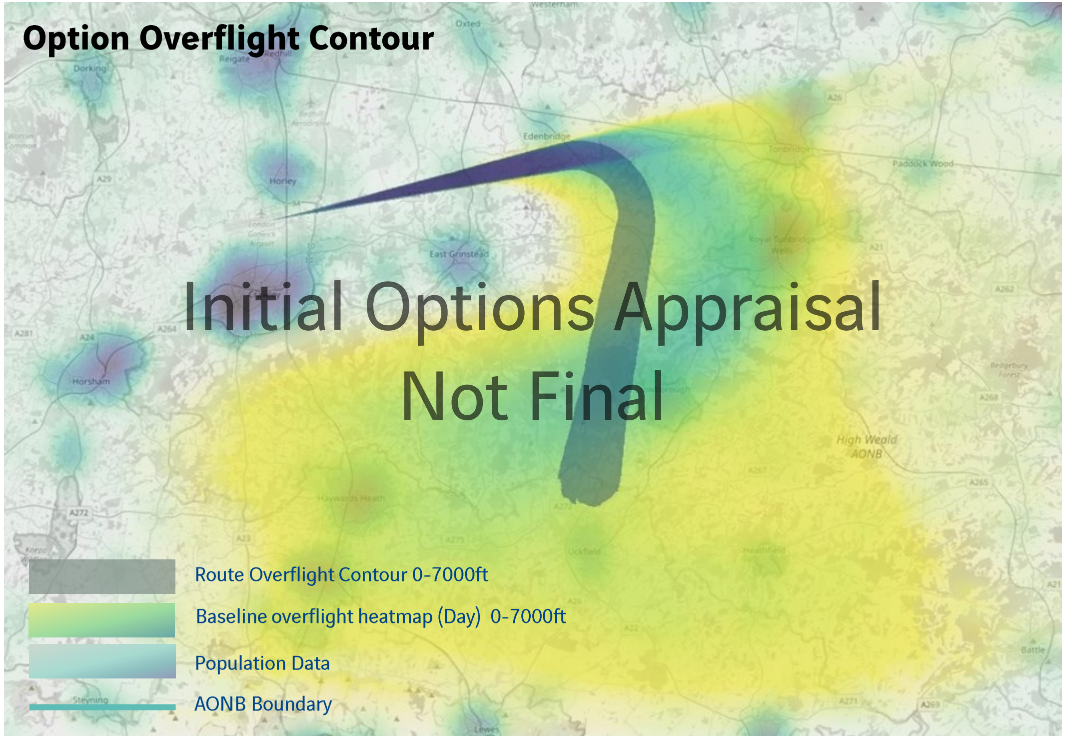
Westerly Arrivals: WAF



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

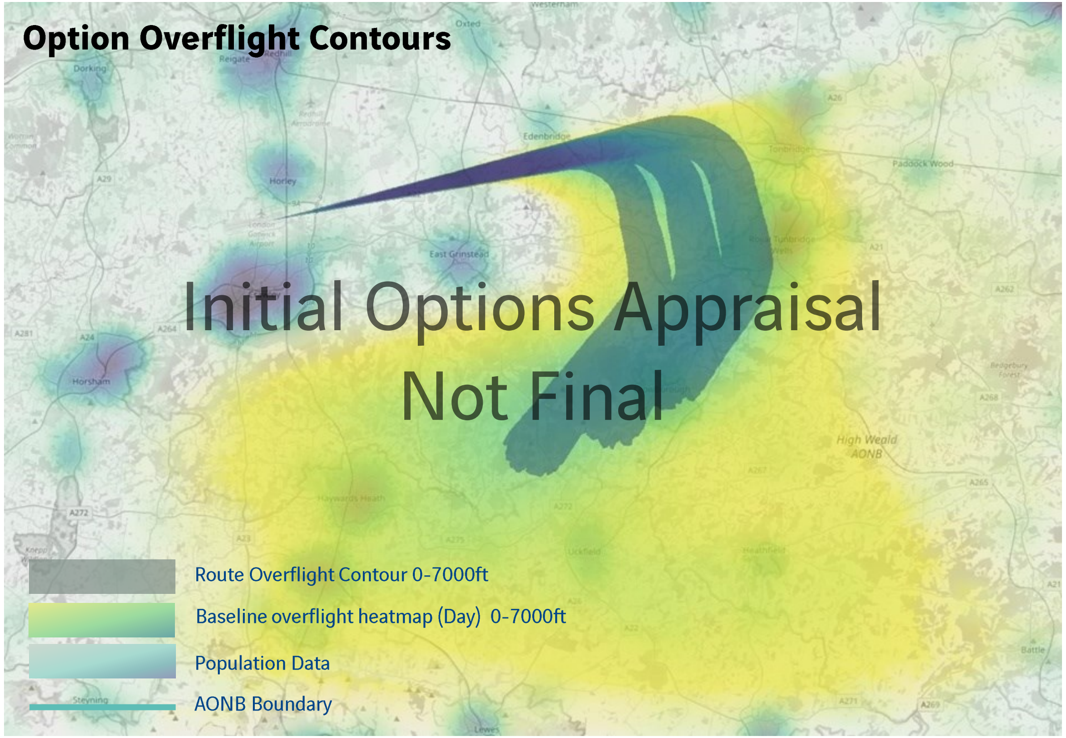
Westerly Arrivals: WAH



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

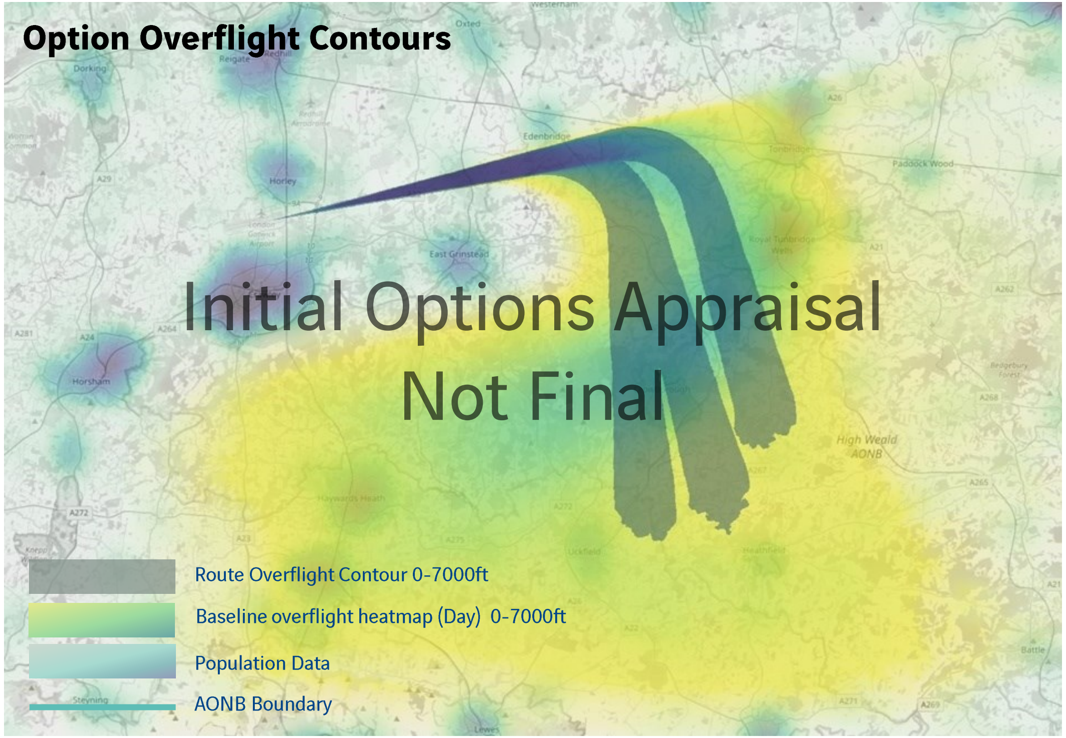
Westerly Arrivals: WAI



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

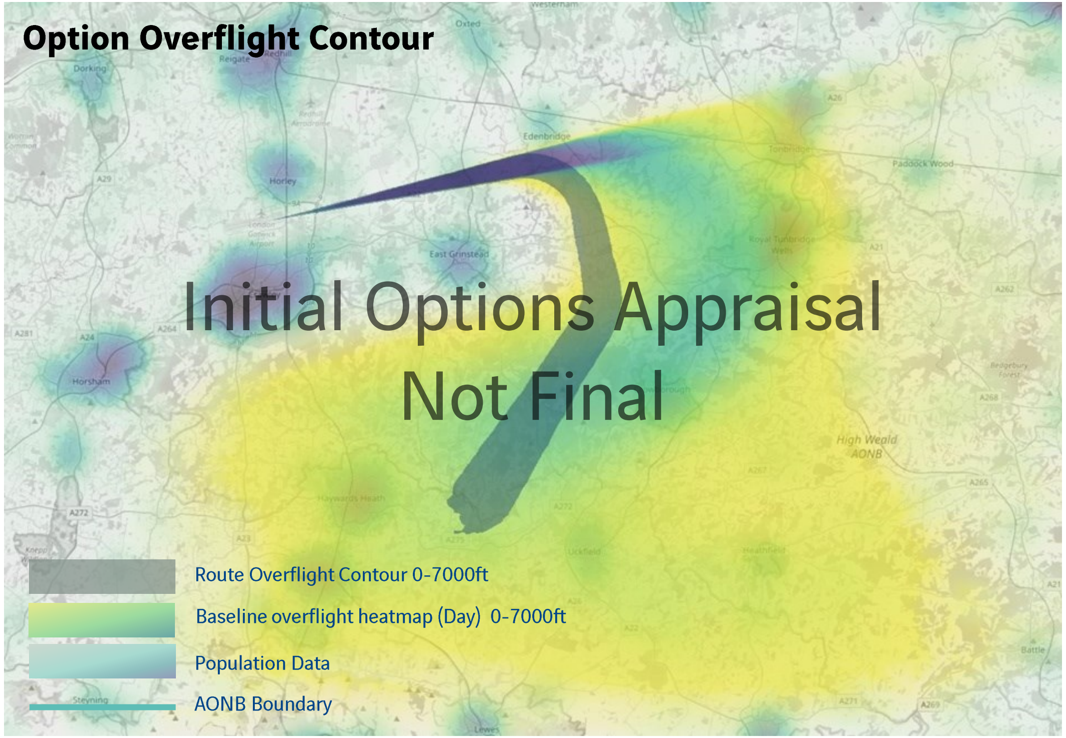
Westerly Arrivals: WAJ



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

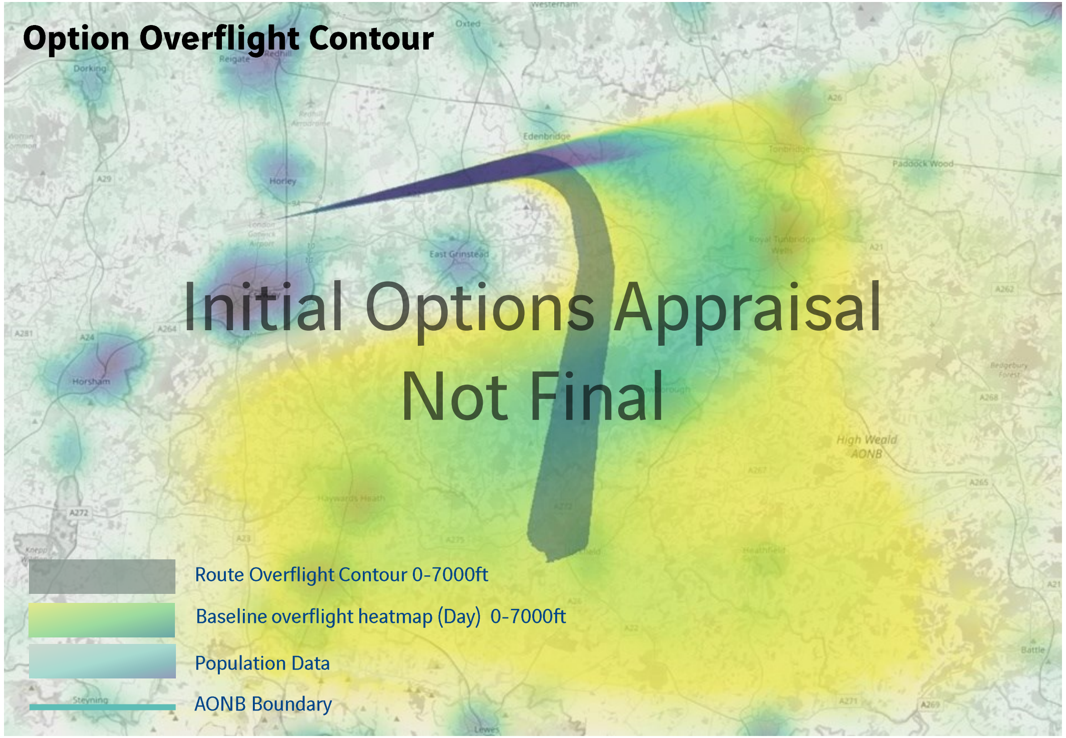
Westerly Arrivals: WAK



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

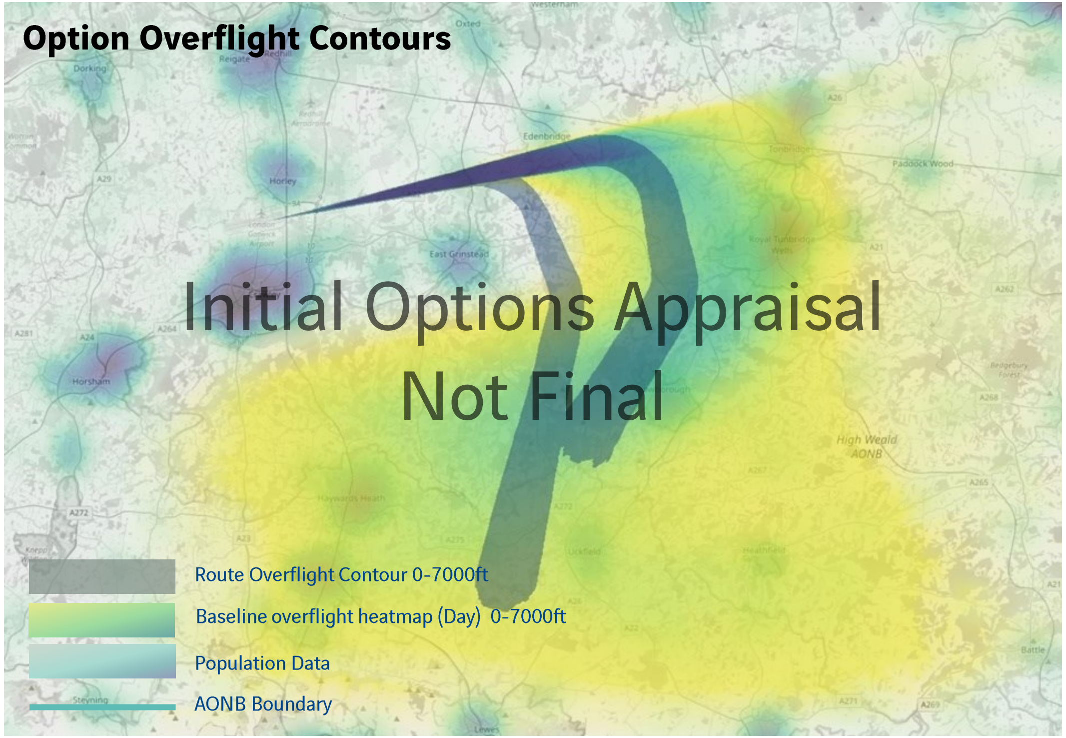
Westerly Arrivals: WAL



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

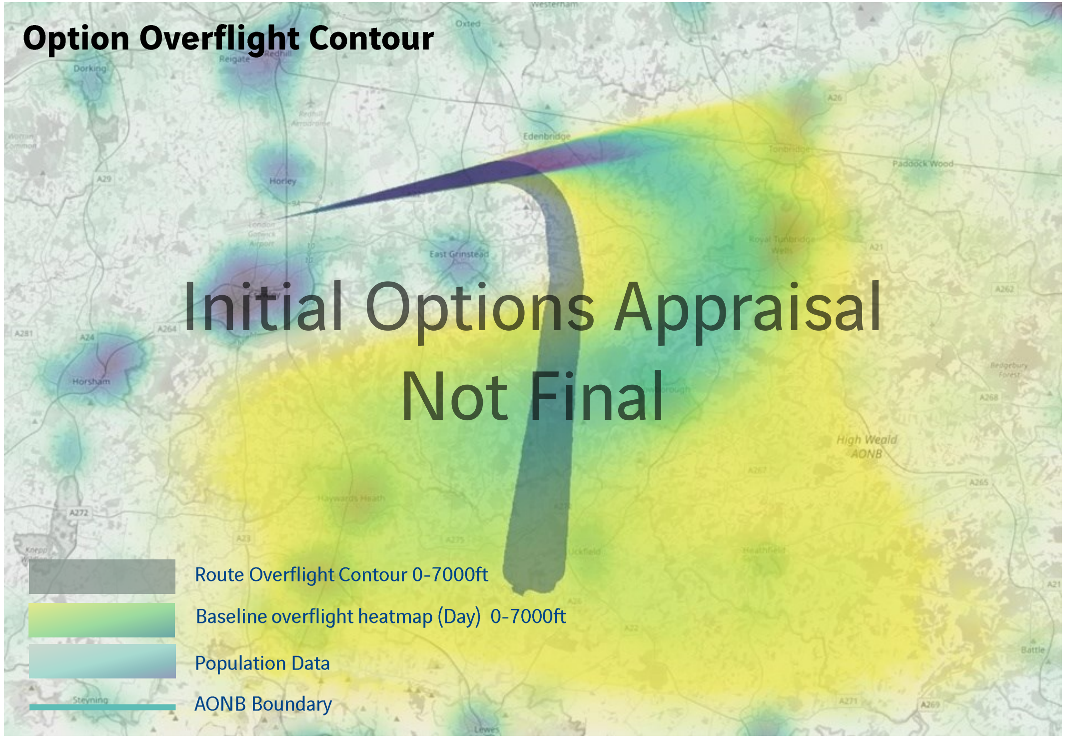
Westerly Arrivals: WAM



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

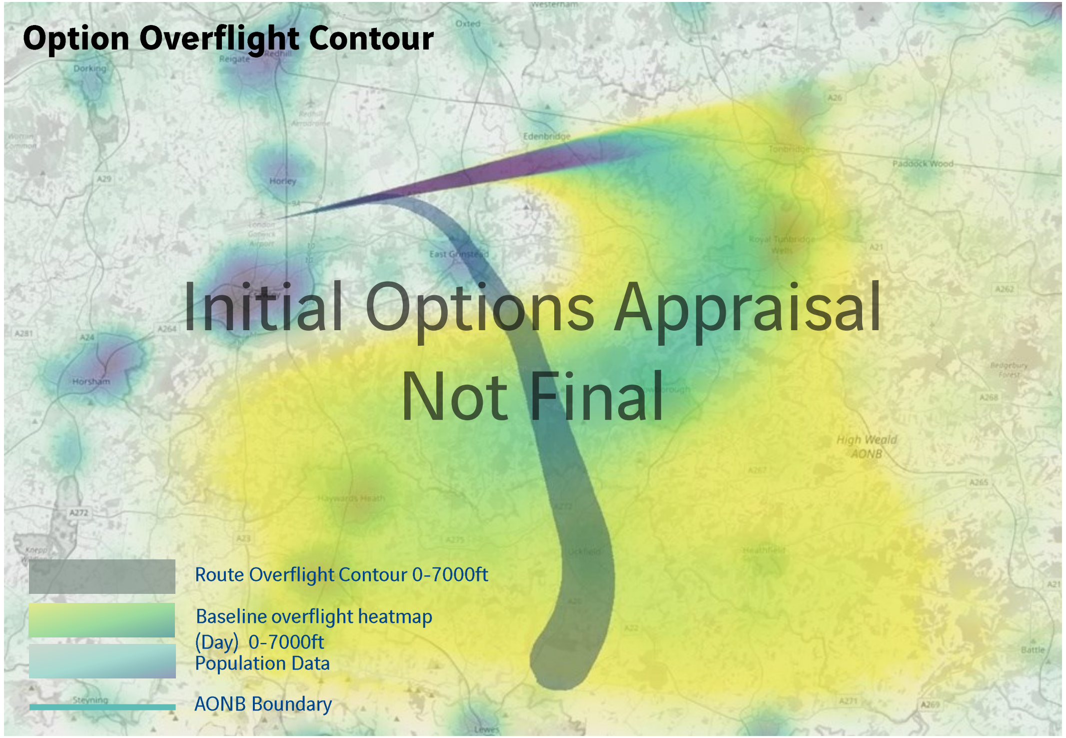
Westerly Arrivals: WAO



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly Arrivals: WAP



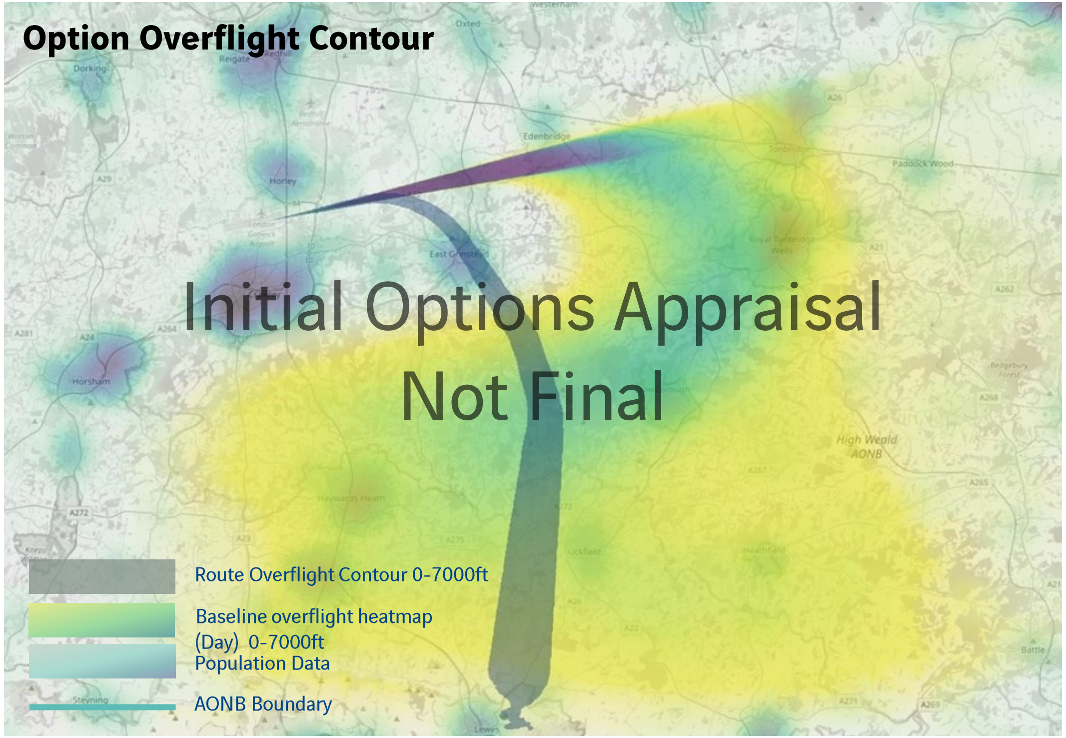
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Westerly Arrivals: WAQ

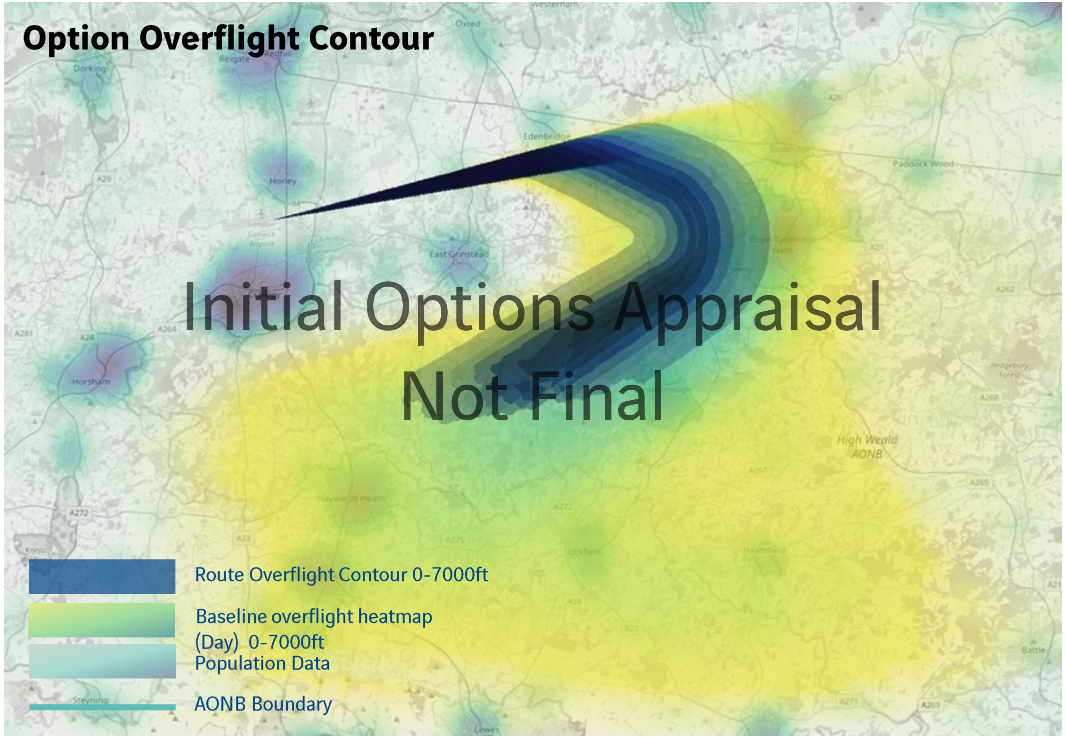
The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.



LONDON GATWICK

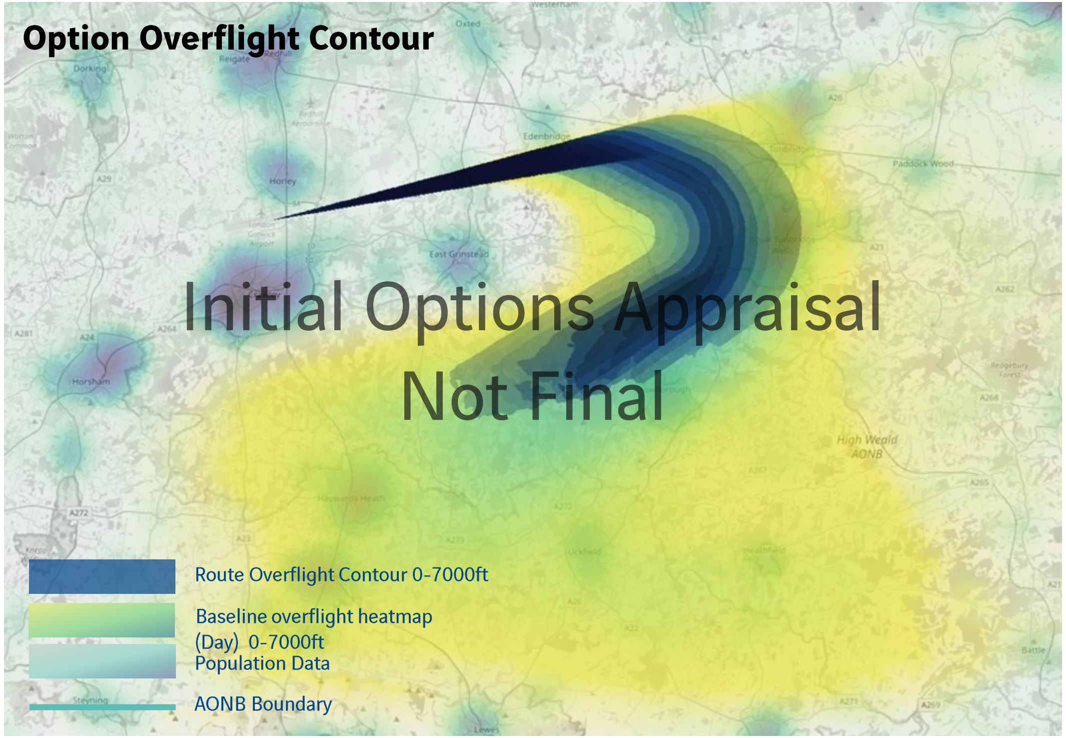
Westerly Arrivals: RMA 8nm – 12nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

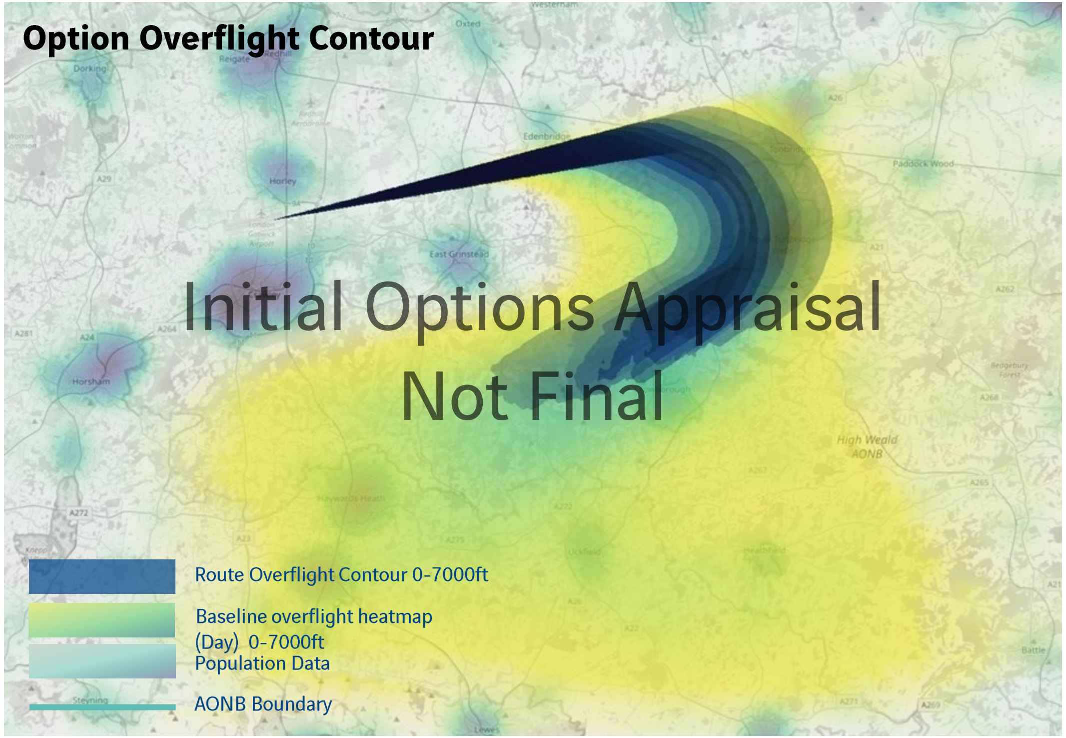
Westerly Arrivals: RMA 9nm – 13nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

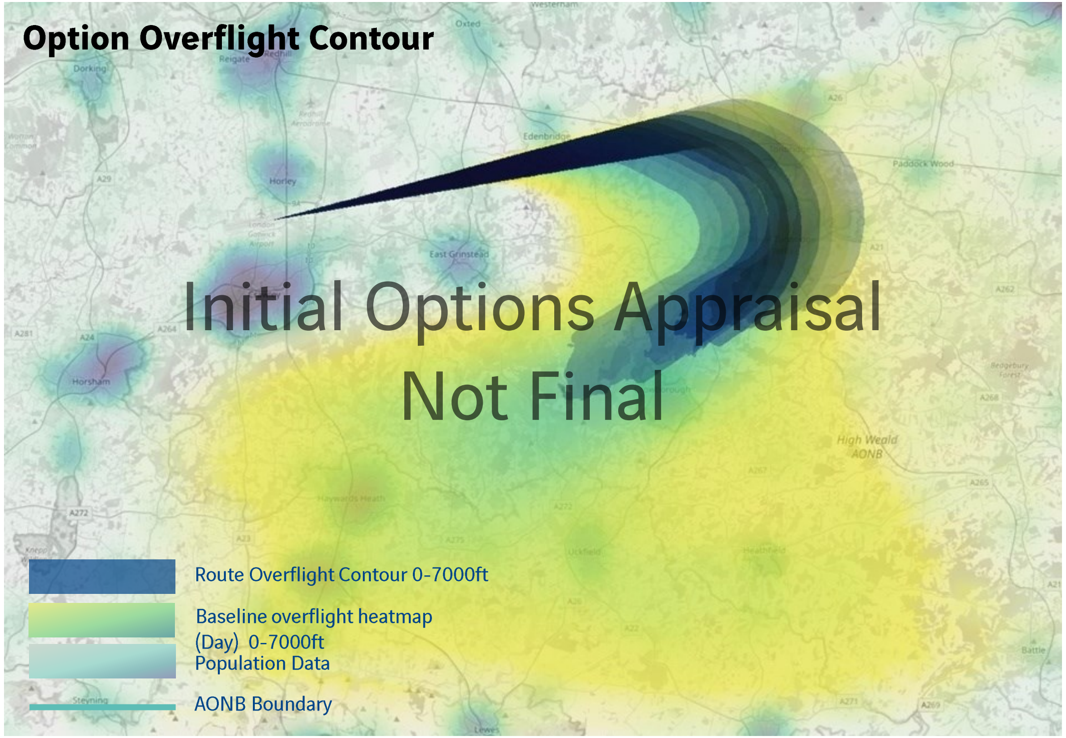
Westerly Arrivals: RMA 10nm – 14nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

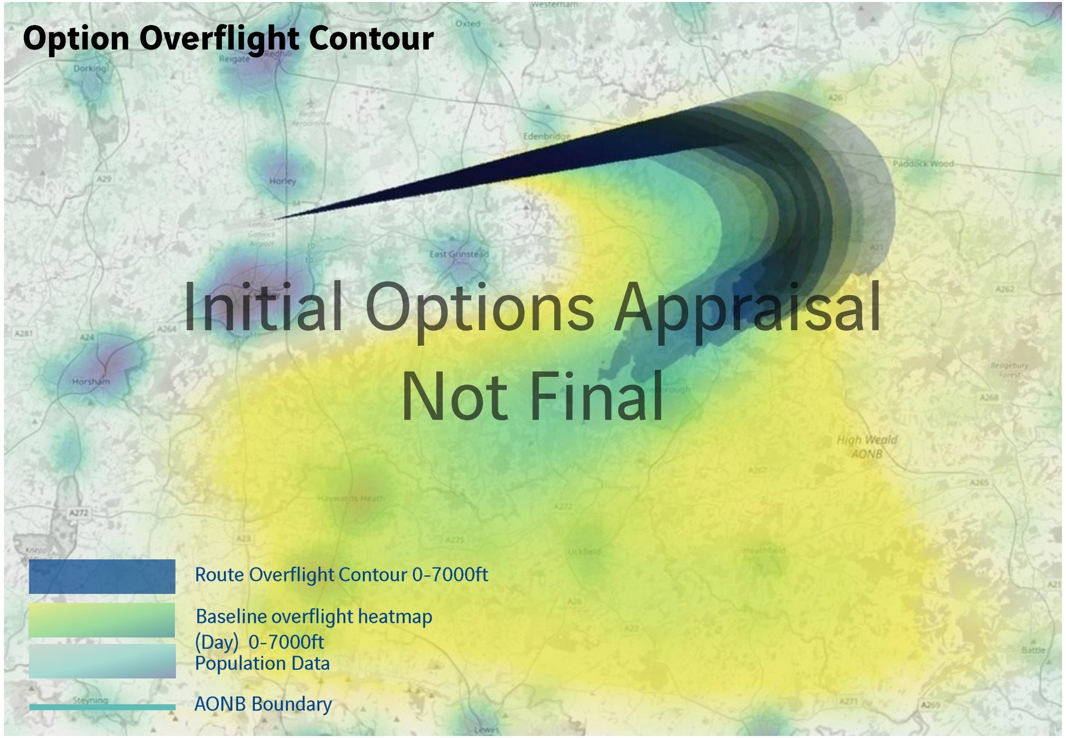
Westerly Arrivals: RMA 11nm – 15nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

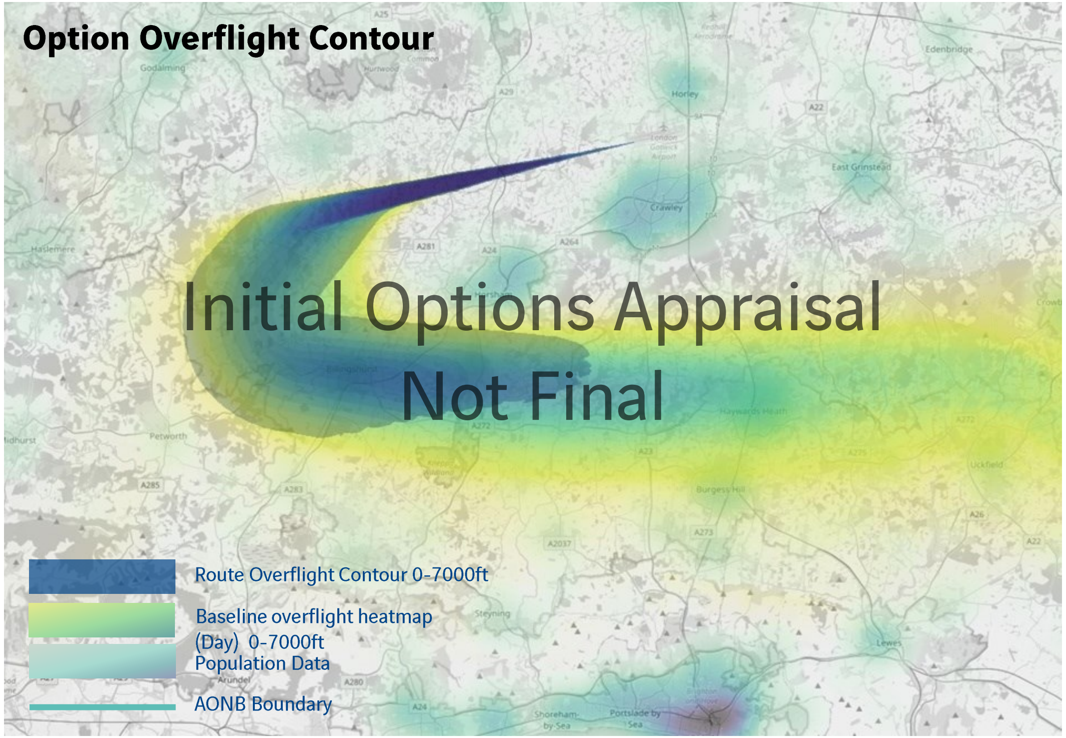
Westerly Arrivals: RMA 12nm – 16nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

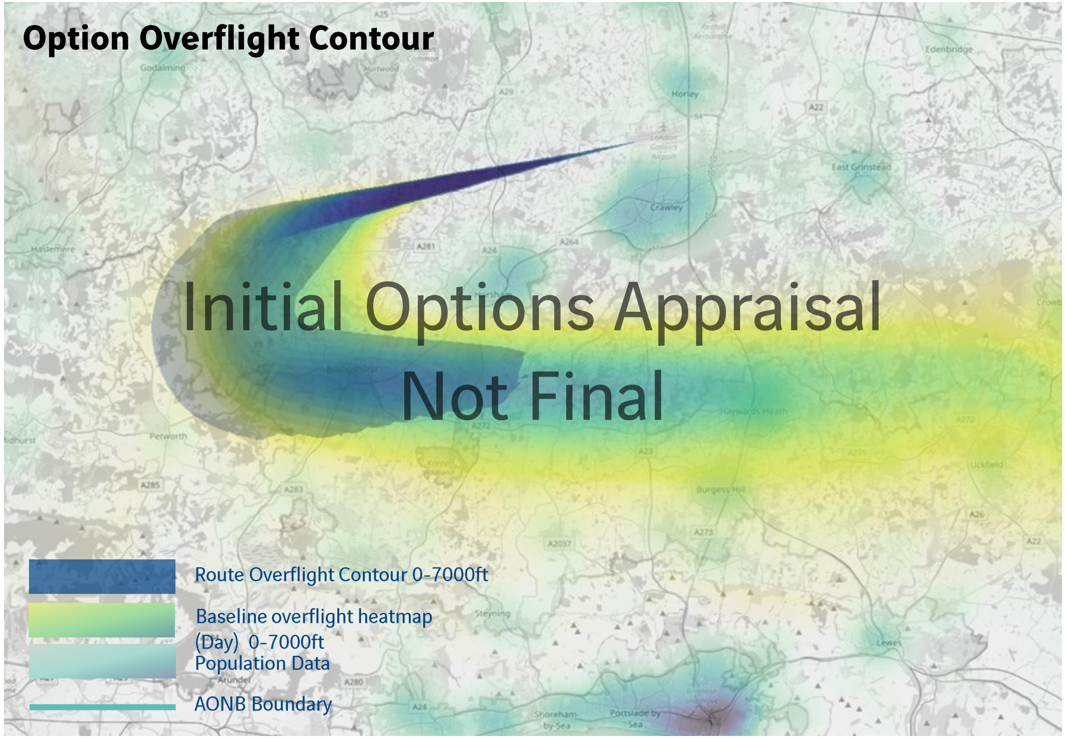
Easterly Arrivals: RMA 8nm – 12nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

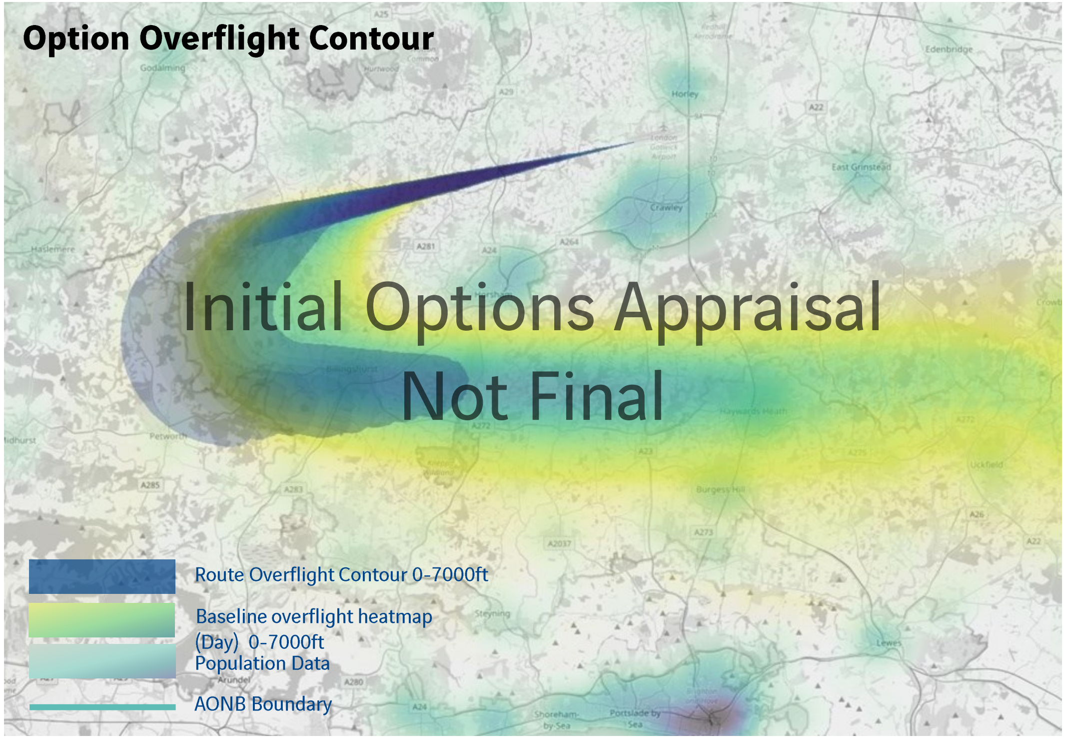
Easterly Arrivals: RMA 9nm – 13nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

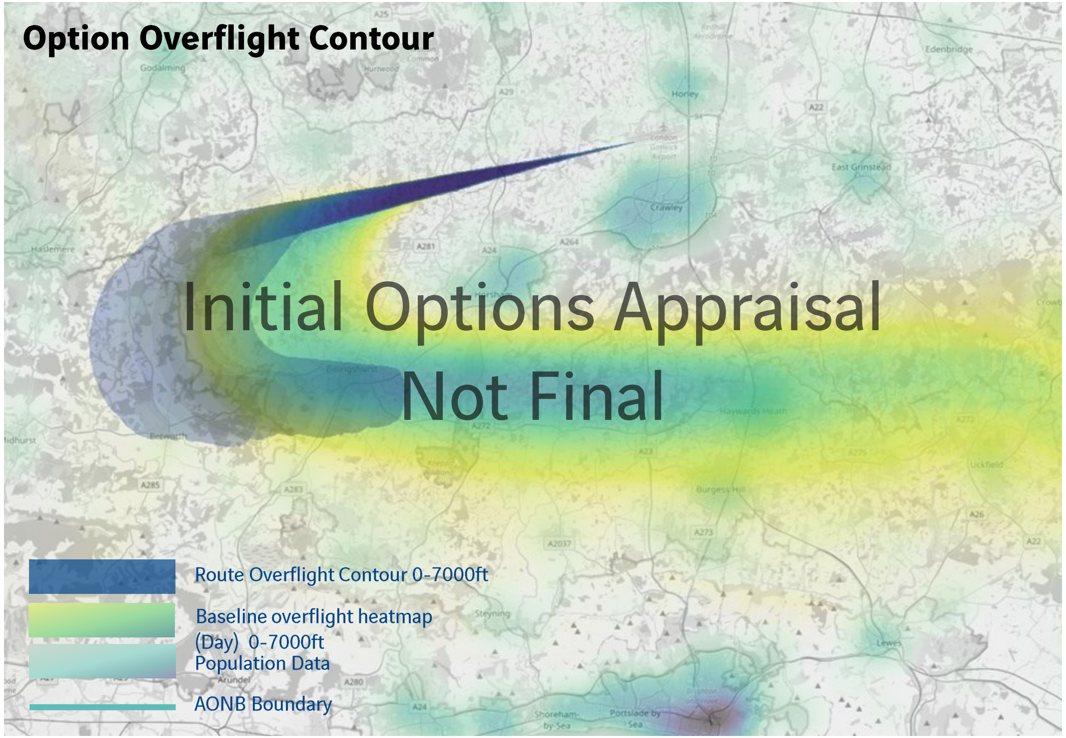
Easterly Arrivals: RMA 10nm – 14nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

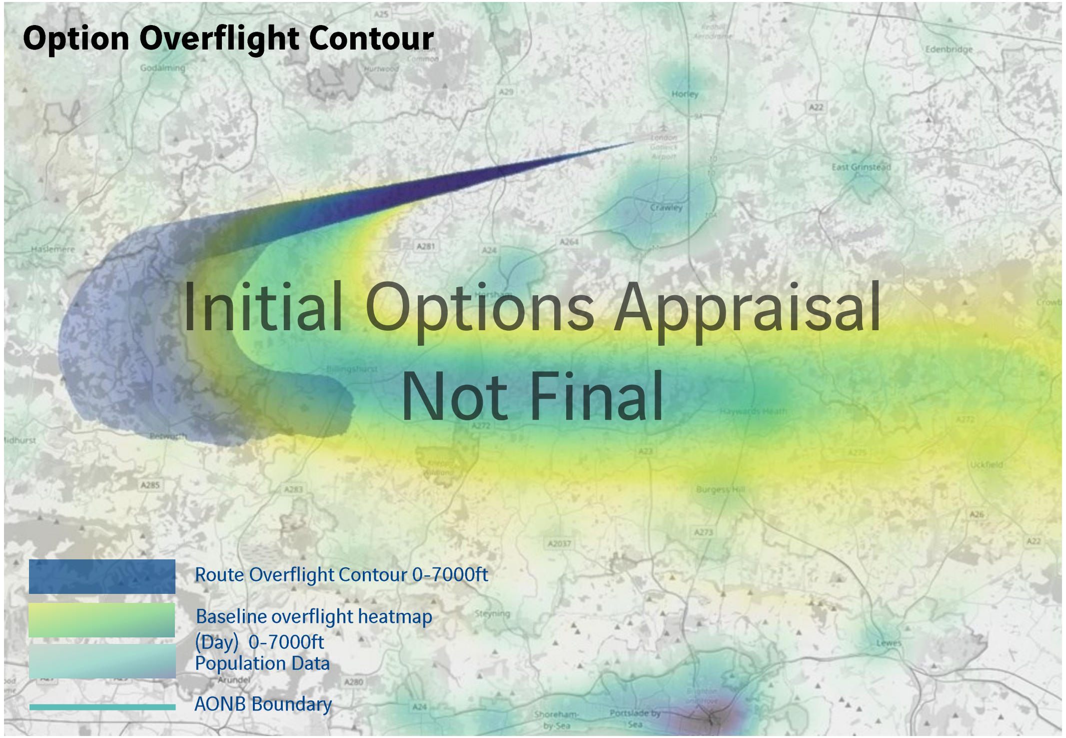
Easterly Arrivals: RMA 11nm – 15nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

Easterly Arrivals: RMA 12nm – 16nm



The options and any data shown in this document should not be considered final.

All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.