YOUR LONDON AIRPORT Gatwick

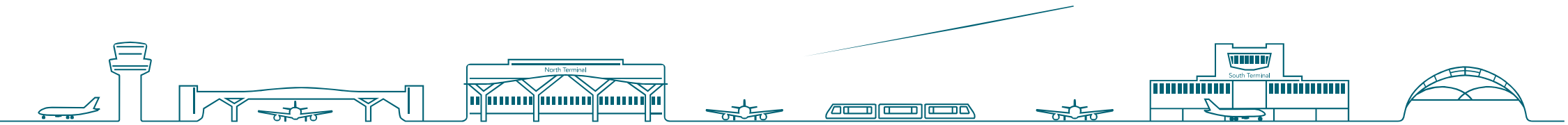
Gatwick Airport FASI South Airspace Change Proposal

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

Virtual Briefing Session

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

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 → 4 → 5. Initial Appraisal of the shortlisted options → 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.

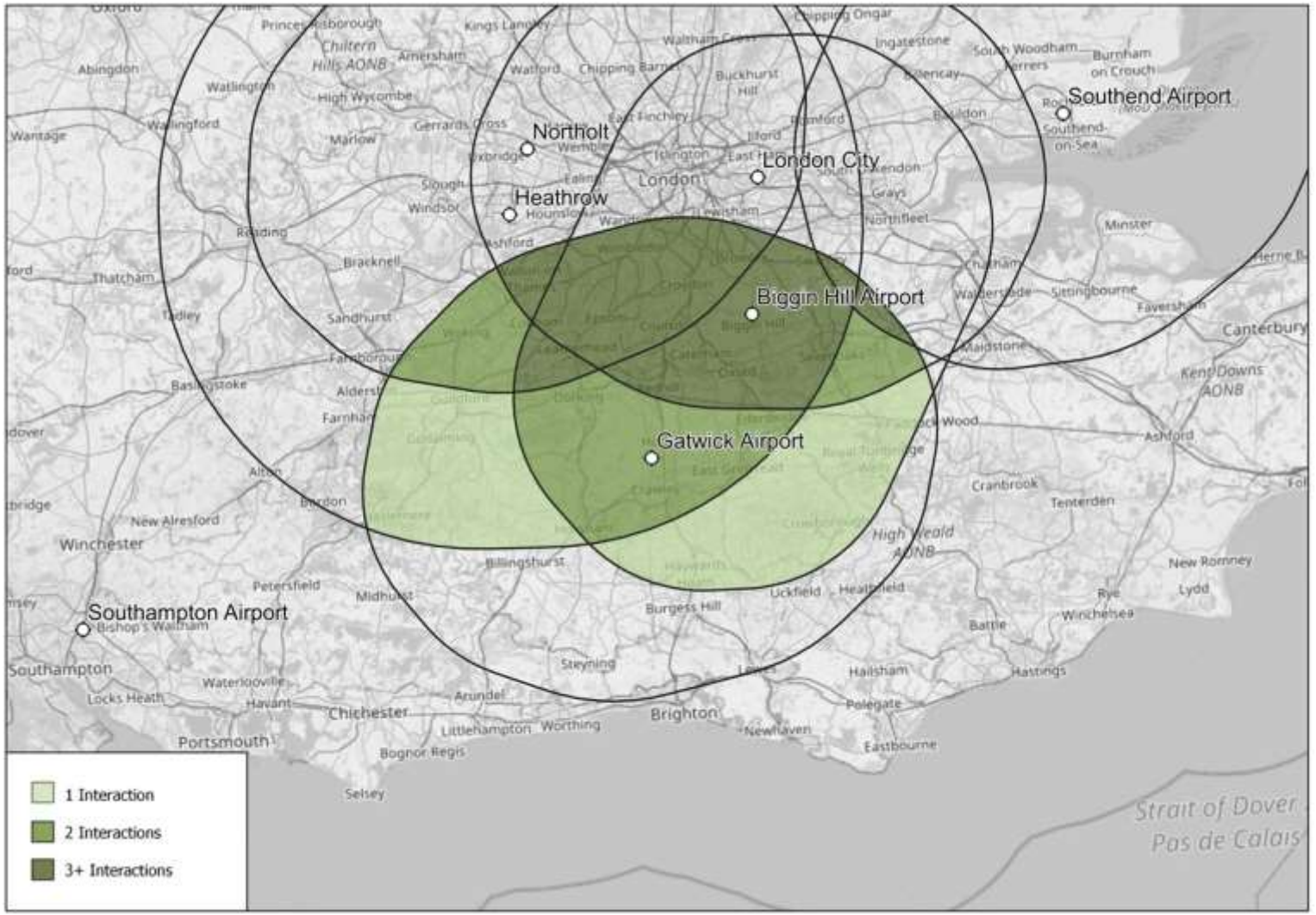
- The final Masterplan will be developed in a series of Iterations and will take some time.
- Airspace modernisation is a long and complex process.
- Larger ACPs with many interdependencies can take longer than smaller ones with fewer.
- The background context and policies associated with modernisation 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.

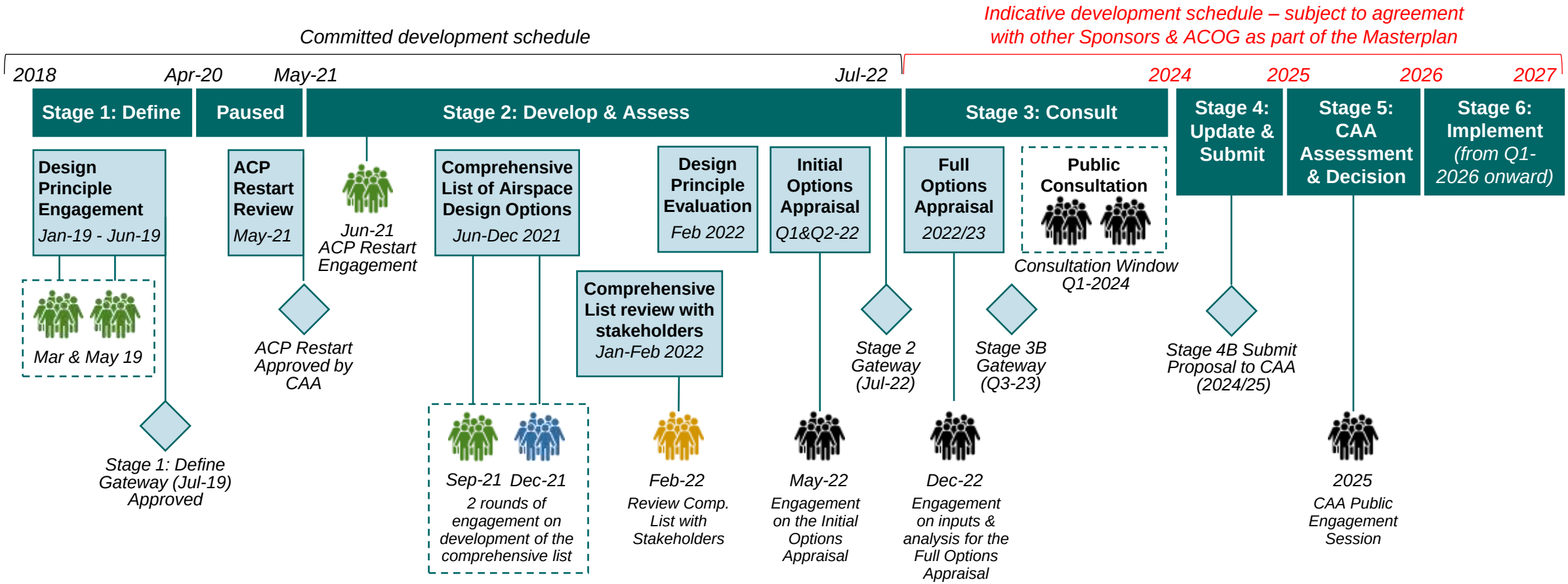
2. UPDATE ON THE UK AIRSPACE CHANGE MASTERPLAN (4)



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

Questions

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

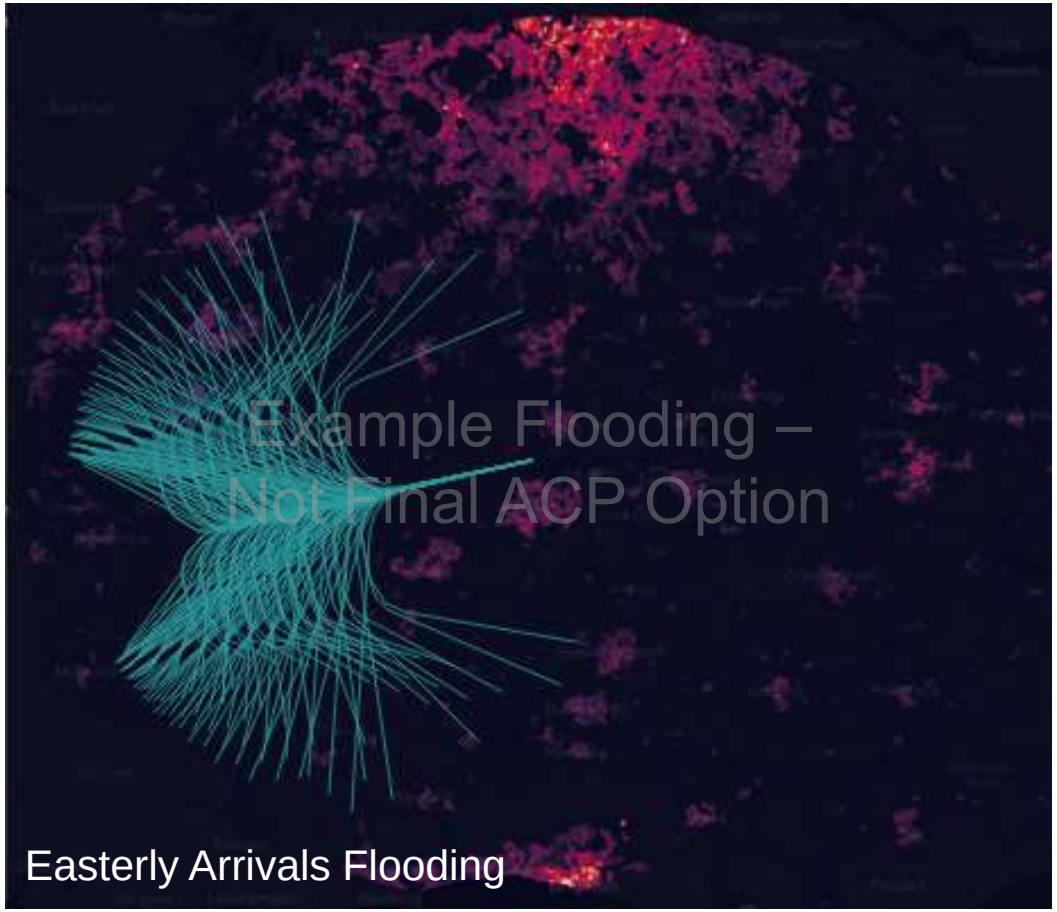
We will define the broad range of notional flight paths that are technically possible within each section of airspace – an approach known as flooding.

Preliminary Assessment

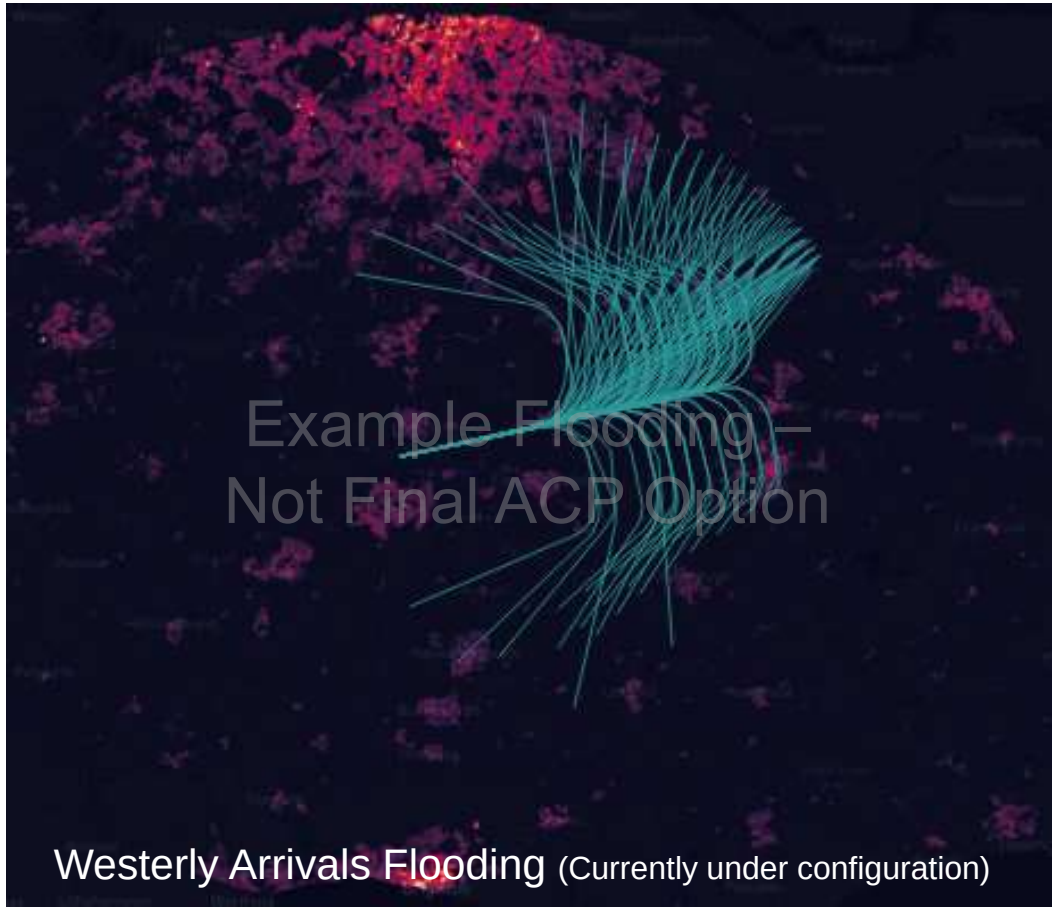
A core set of information will be produced through a preliminary assessment of the performance of each individual notional flight path using a variety of noise and overflight measurements.

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

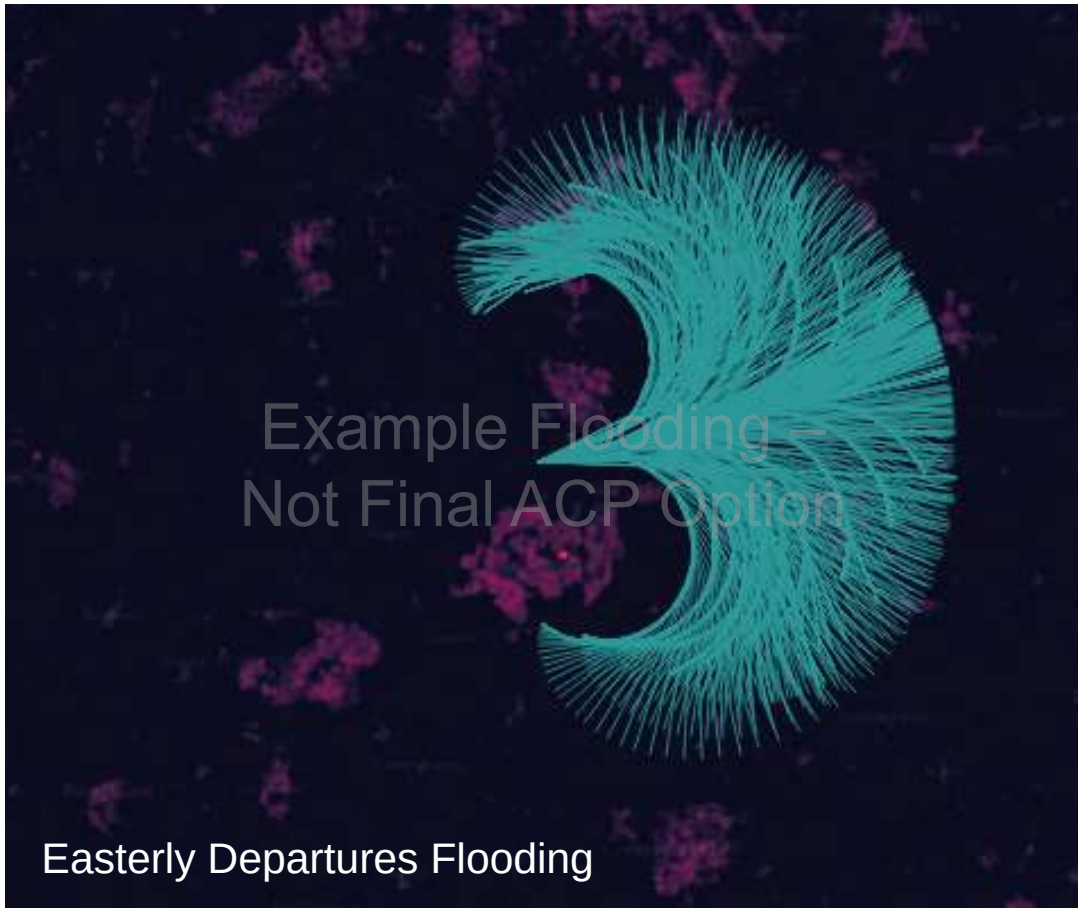


Westerly Arrivals Flooding (Currently under configuration)

AIRSPACE DESIGN DATABASE: DEPARTURE INPUTS

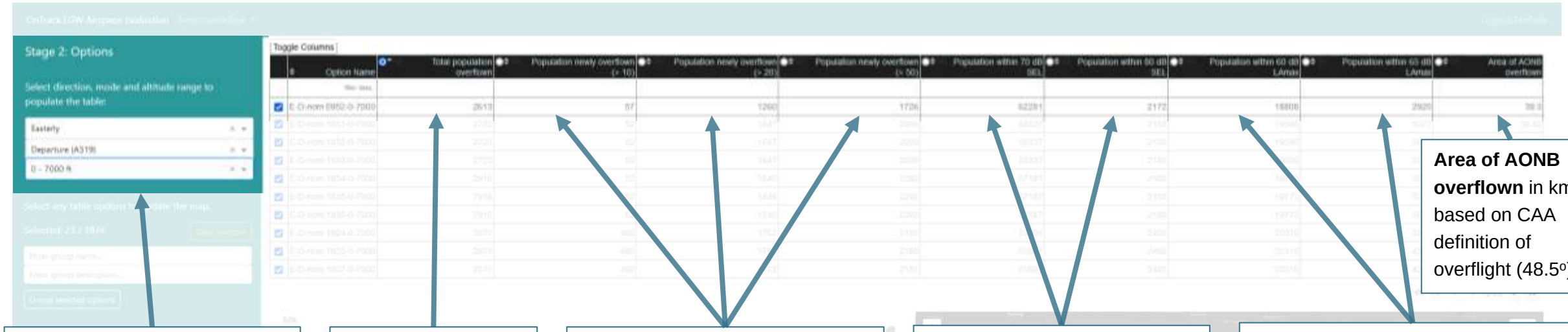
The Airspace Design Database contains information on thousands of notional flight paths which were developed as part of the ‘flooding’ exercise:

Westerly Departures Flooding



Easterly Departures Flooding

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



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

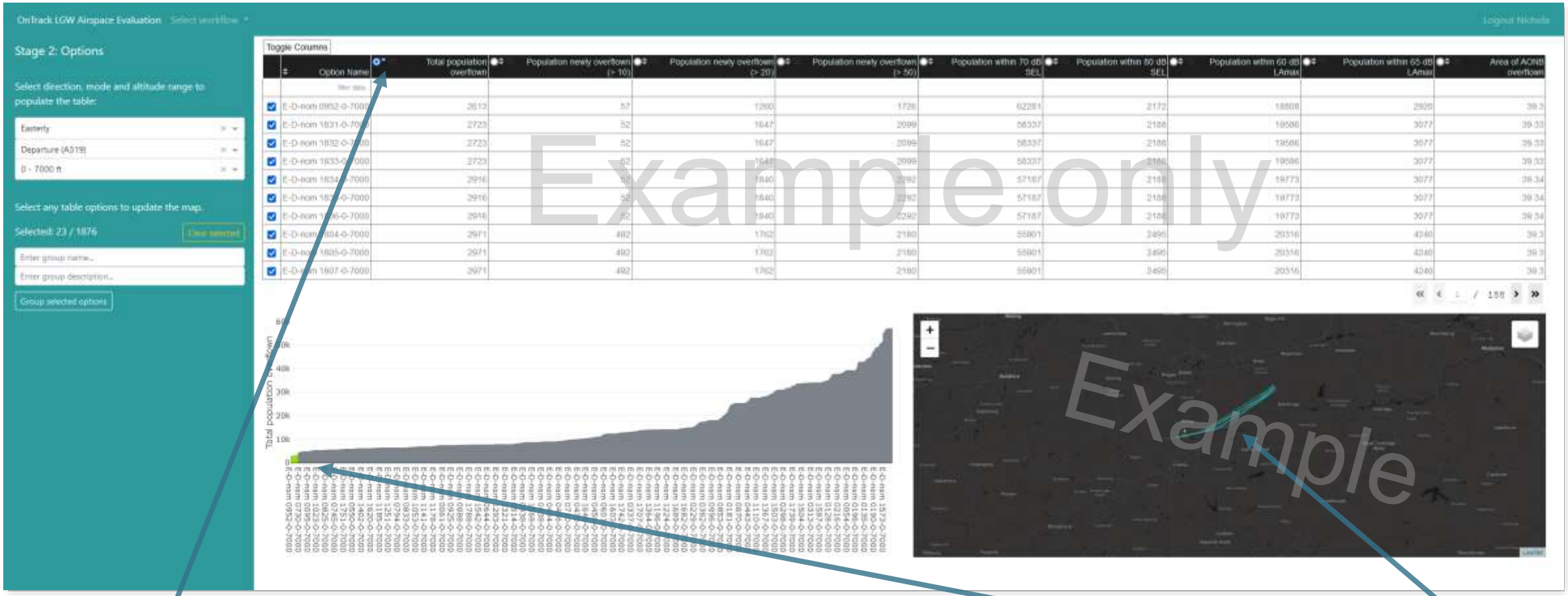
The database calculates the number of people within the 60 dB and 65dB L_{Amax} contours.

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.

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

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



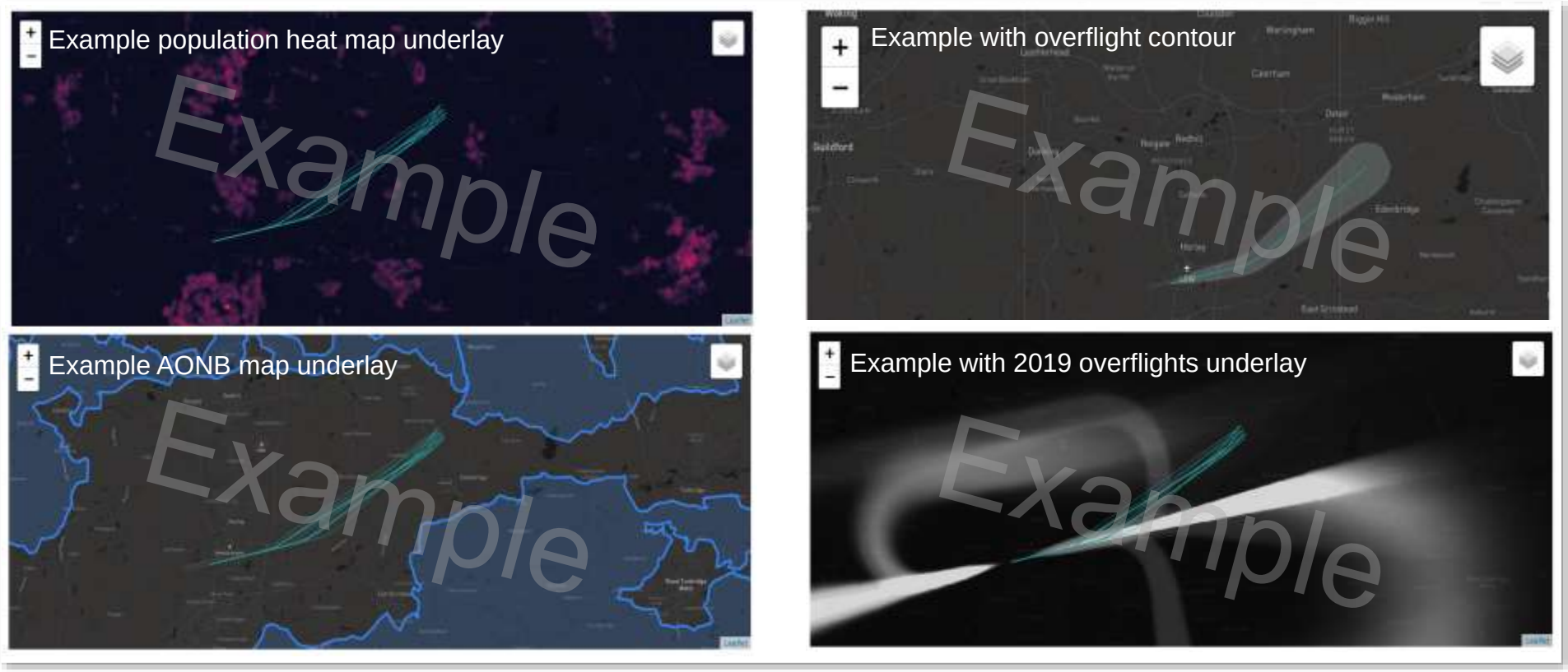
Metrics are sorted to identify high performing notional flight paths. This updates the table and the graph. Here we have ordered the data from low to high to identify the paths that overfly the lowest number of population.

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

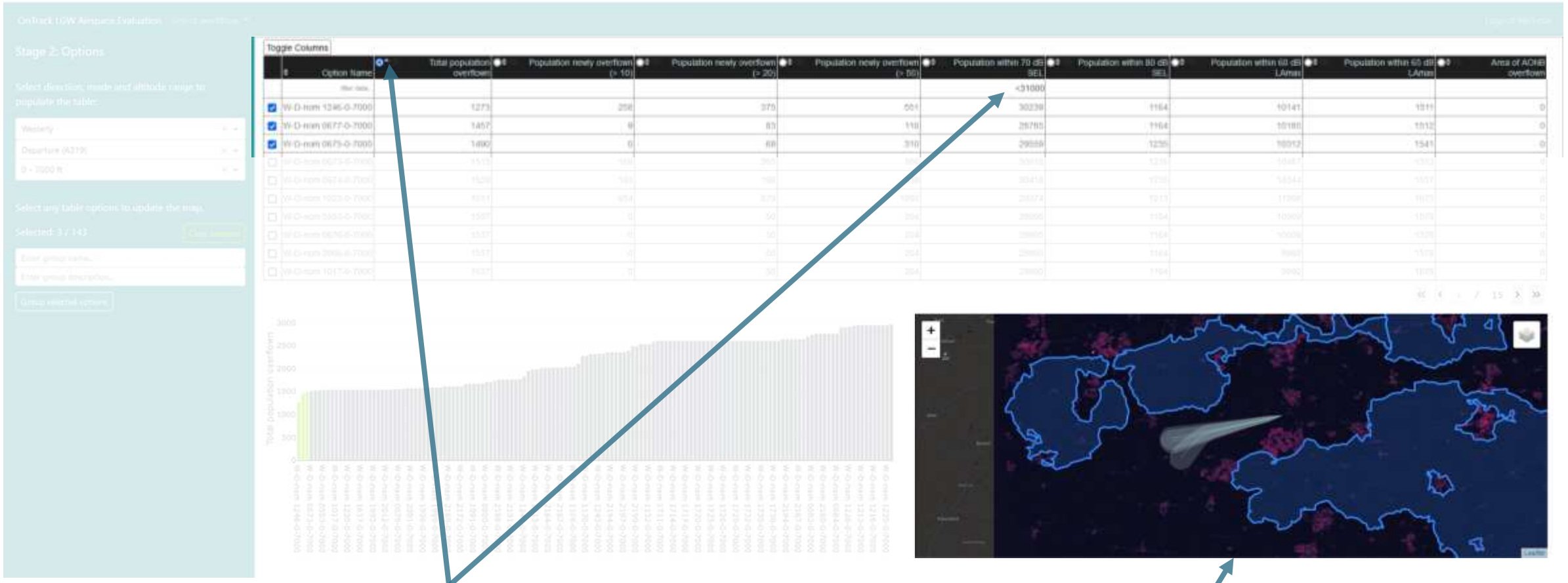
Selected notional flight paths are displayed on the map.

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 example 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 example 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