YOUR LONDON AIRPORT Gatwick

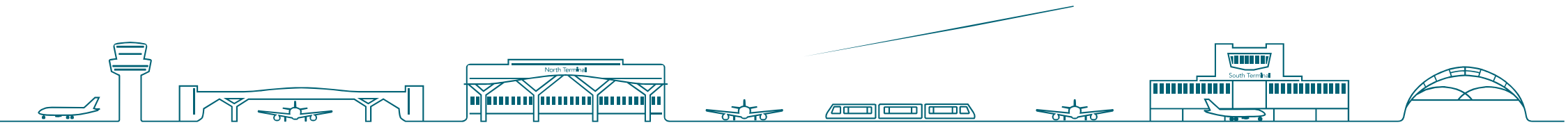
Gatwick Airport FASI South Airspace Change Proposal

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.

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	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

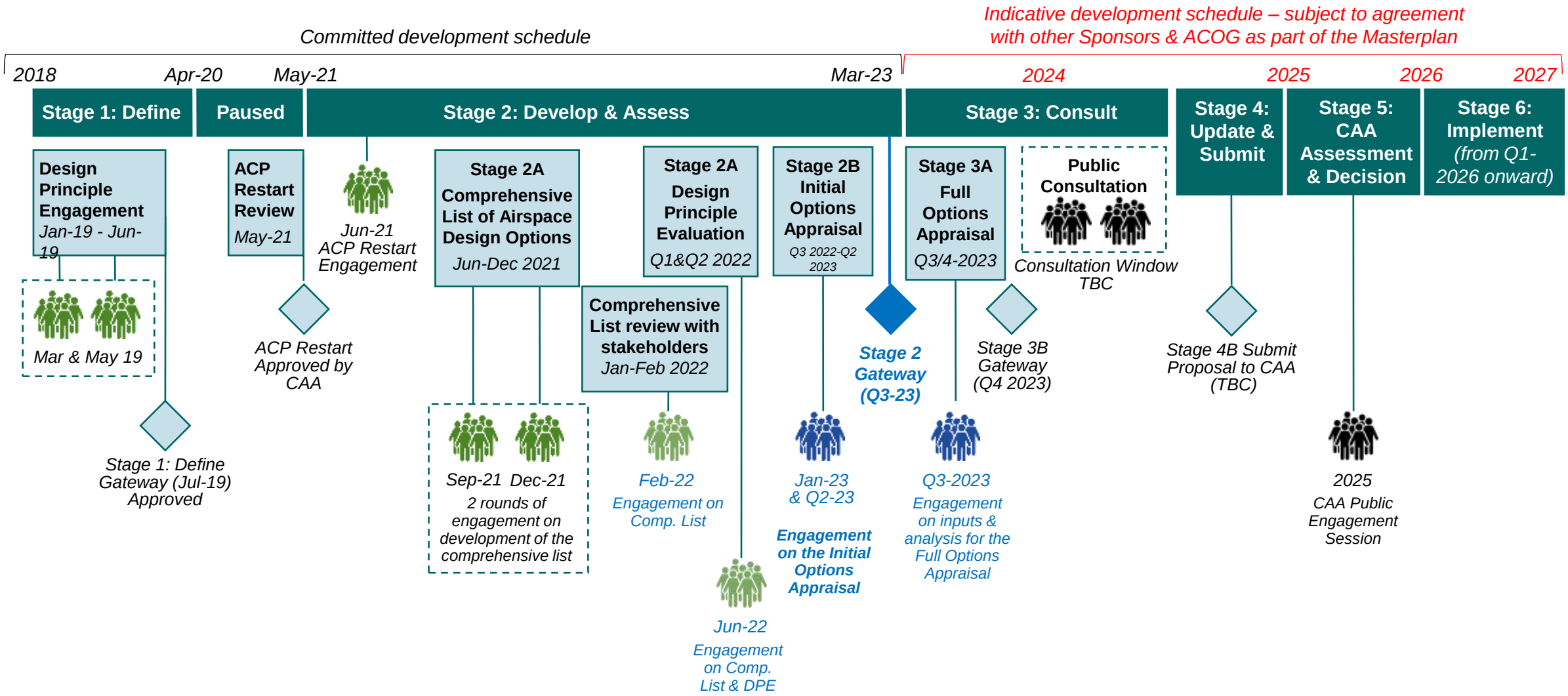
Full Options Appraisal
A more detailed quantitative assessment, including all costs and benefits evaluated in monetary terms where possible

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

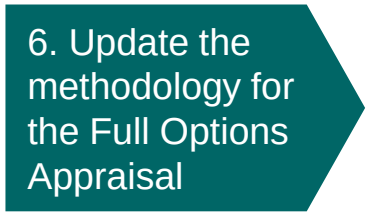
2. OVERALL ACP TIMELINE UPDATE

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:



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

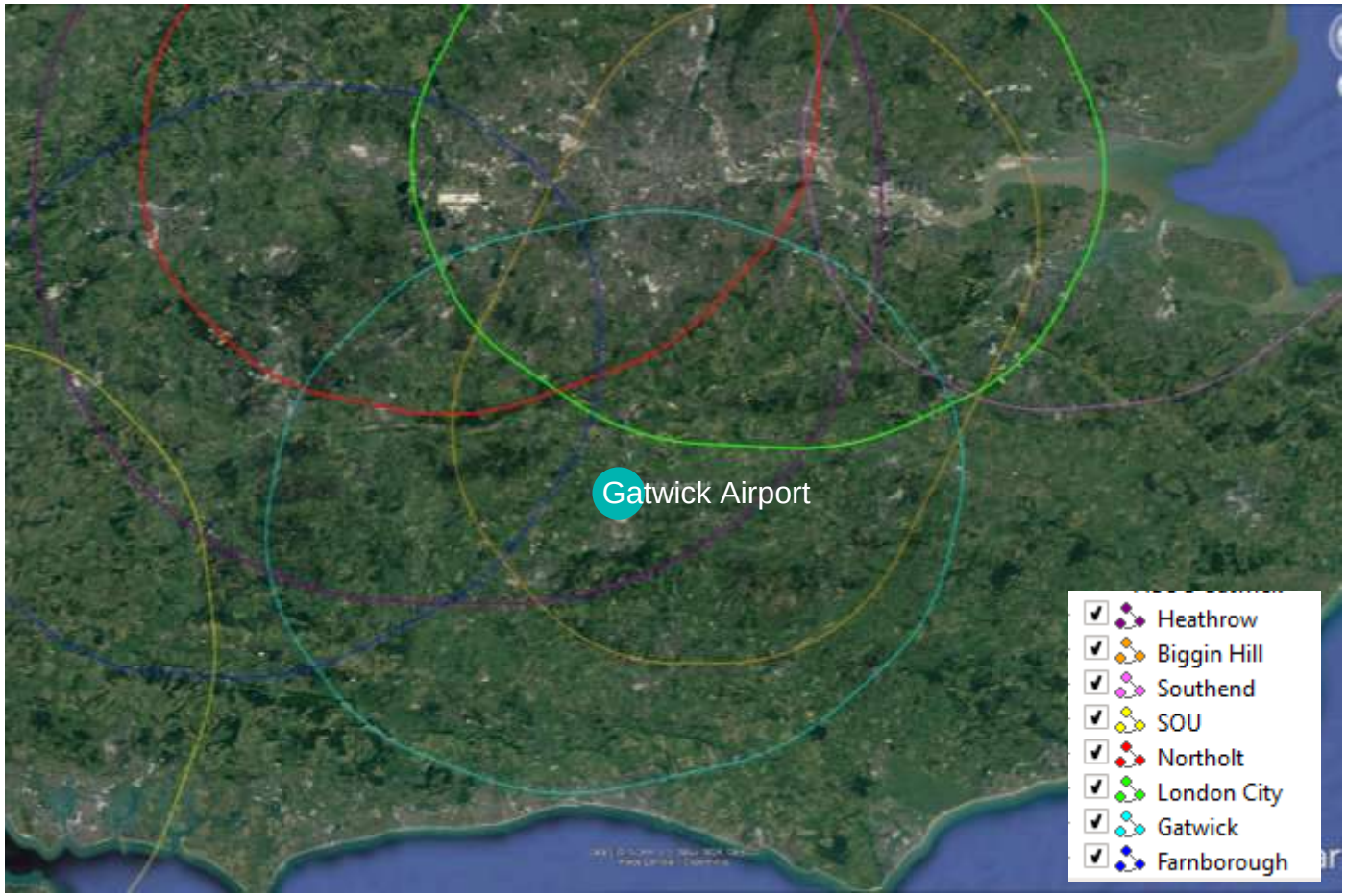
ACOG

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

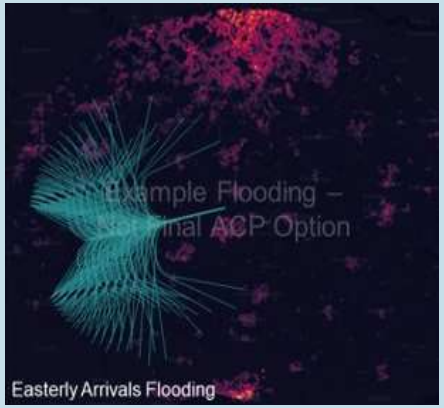
The Airspace Design Database collates a core set of information needed to clearly demonstrate how each option has been identified and why the first list is considered sufficiently comprehensive.

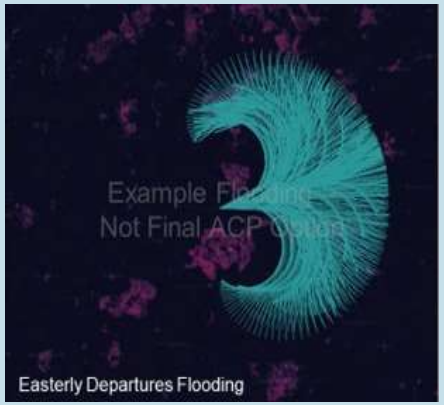
Sections of Airspace

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

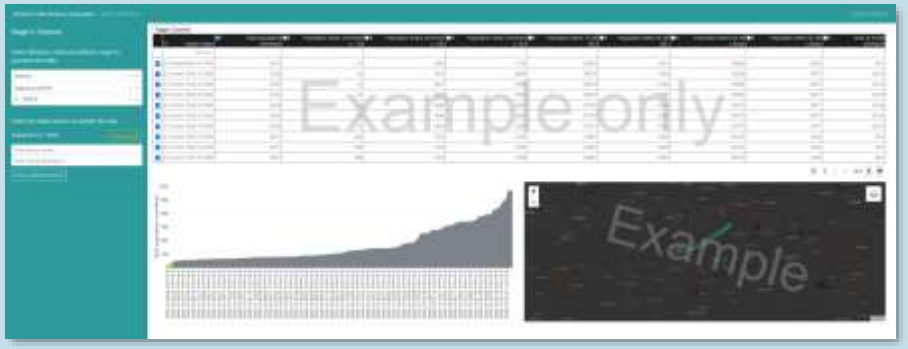
We defined a broad range of notional flight paths that are technically possible within each section of airspace (an approach known as ‘flooding’).





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

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.

Stakeholder Engagement

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.

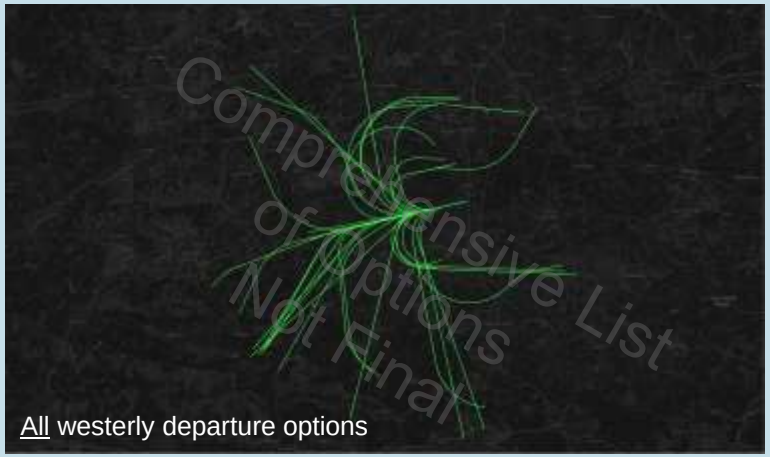
Following the engagement, all feedback was reviewed and where appropriate used to develop further options. The key themes arising from stakeholders' feedback that resulted in further options being developed were:

- 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**

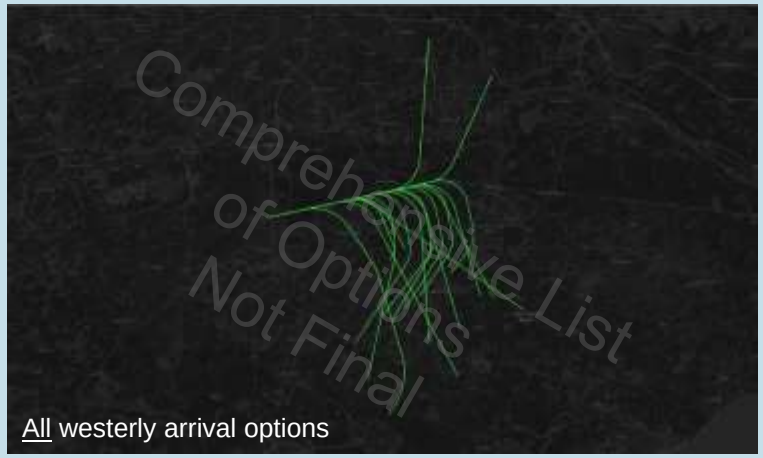
Following Stakeholder Engagement, the Comprehensive List comprised of 70 options.
(17 westerly departure options, 18 easterly departure options, 18 westerly arrival options and 17 easterly arrival options).



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.

Where we are now

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.

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.

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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

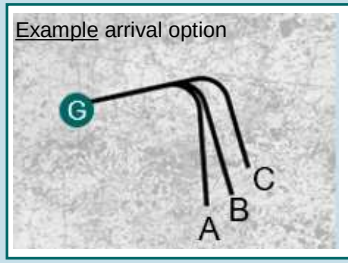
Design Principle Evaluation Methodology

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. **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.	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
		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. • 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.

Broad departure flows within the network airspace

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

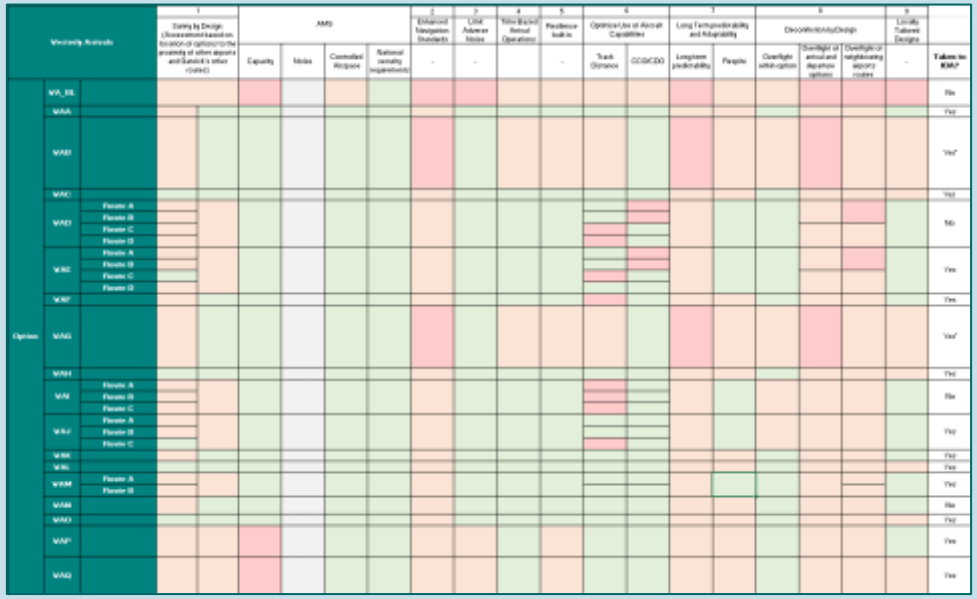
Questions & Answers

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**

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.

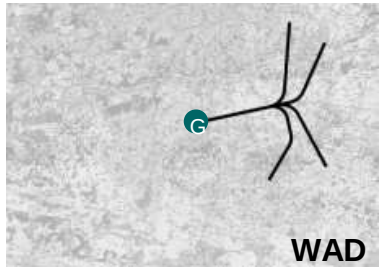
DPE Outcomes: Example

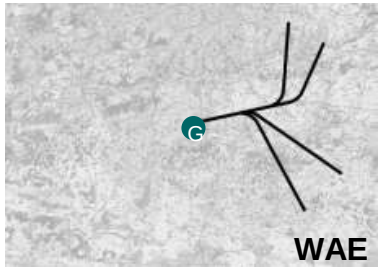
- When developing the options, we used the data from the airspace design database to identify groups of high performing notional paths.
- The Design Principles were then used as a framework to build the options informed by the data in the database.
- As highlighted in previous engagement sessions, sometimes 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.

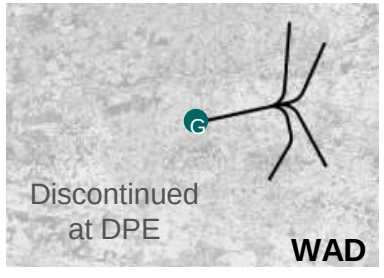
The high performing notional flight path data suggested two configurations and therefore both were added to the CLOO.

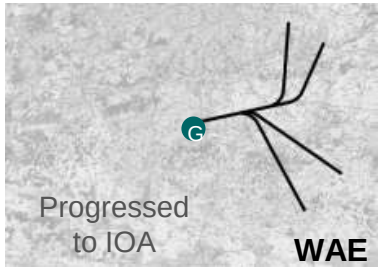




Design Principle Evaluation

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.





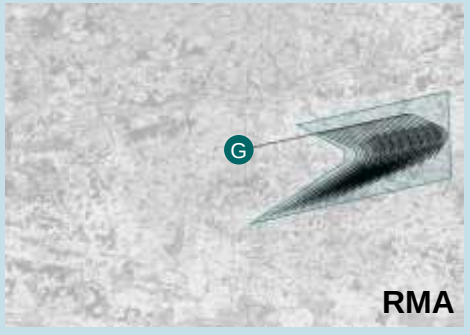
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

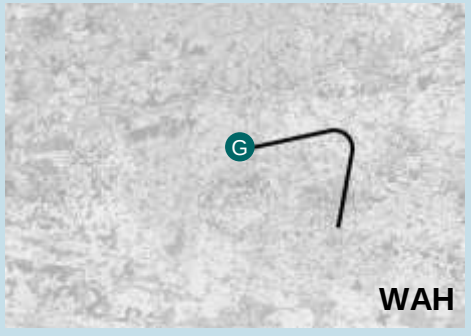
5 **Options for IOA**

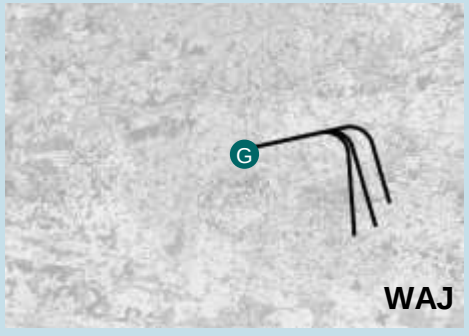
RMA Swathe 0-7000ft
0-7000ft (3º descent)

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.

Westerly Arrival Options







OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

RMA Swathe 0-7000ft
0-7000ft (3° descent)

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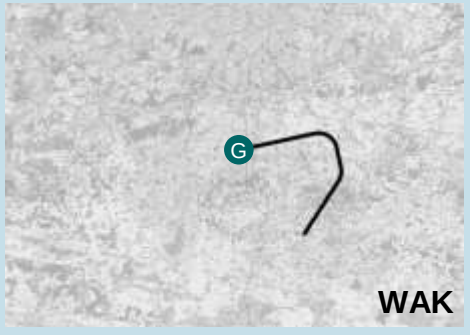
Westerly Arrival Options

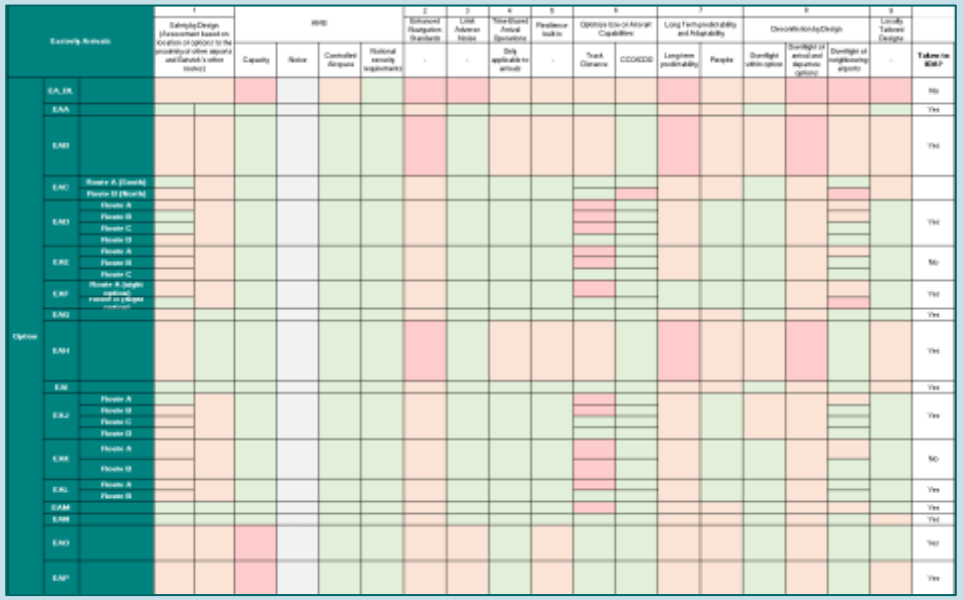


OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

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.

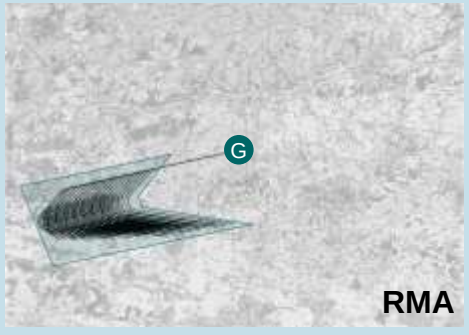
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

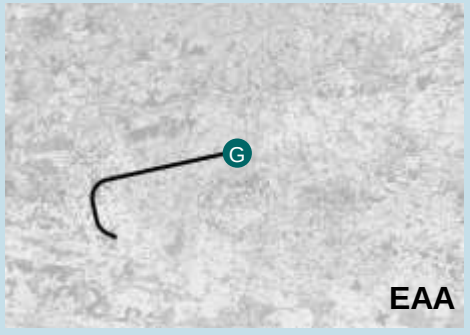
5 **Options for IOA**

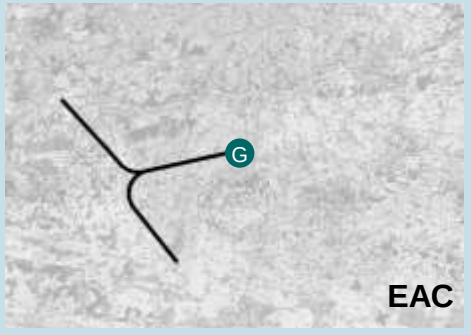
RMA Swathe 0-7000ft
0-7000ft (3° descent)

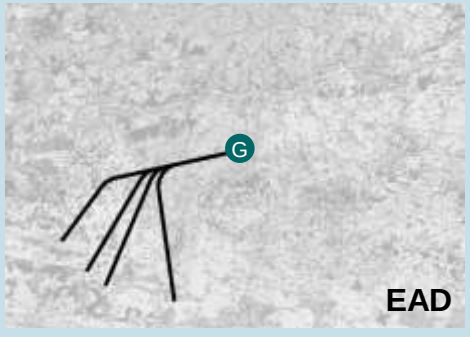
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

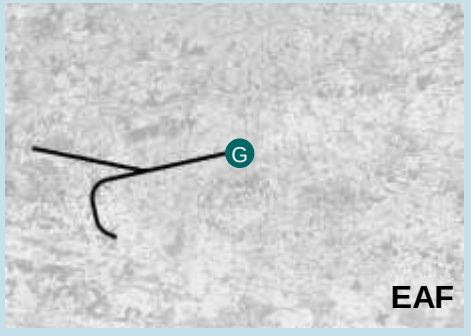
Easterly Arrival Options

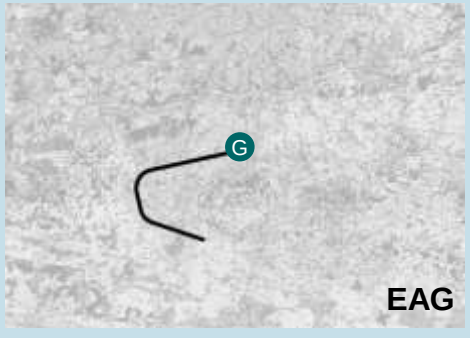


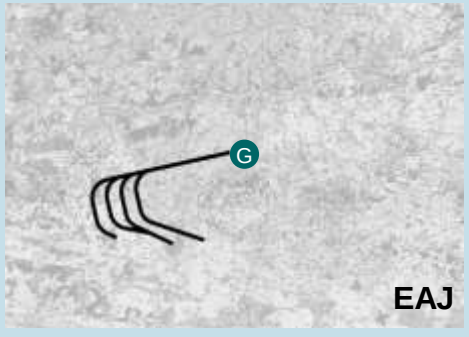












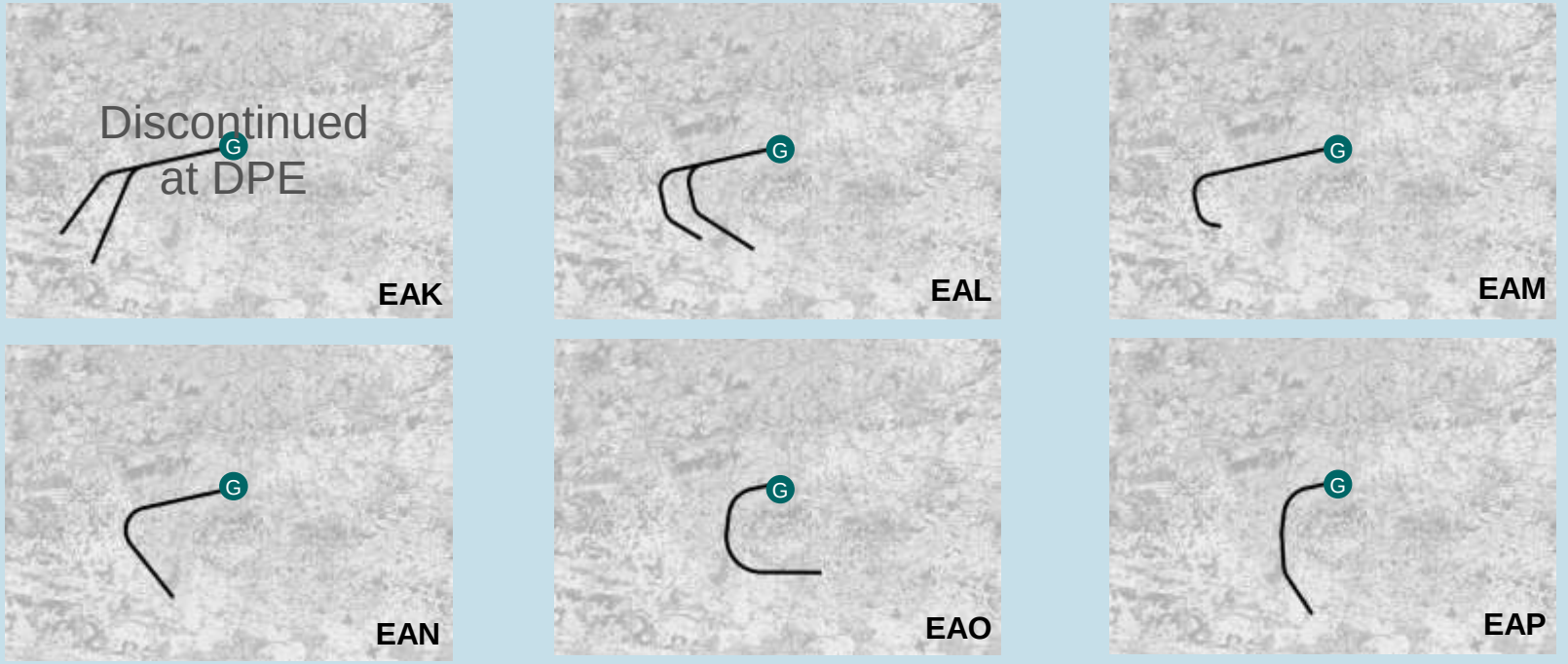
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

RMA Swathe 0-7000ft
0-7000ft (3° 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.

Easterly Arrival Options



OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

4 **Conduct the Design Principle Evaluation**

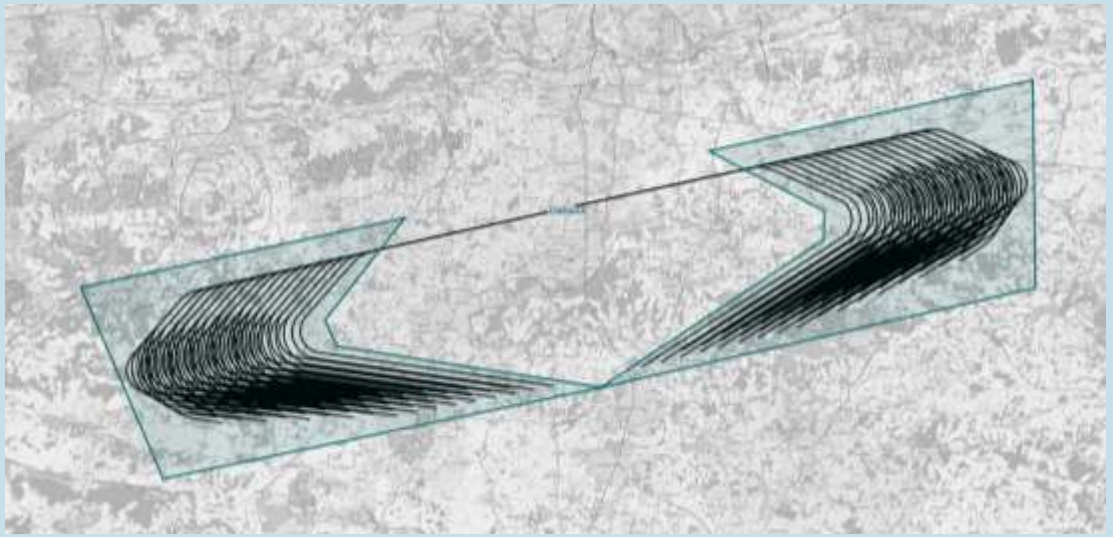
DPE Outcomes: Arrivals RMA

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

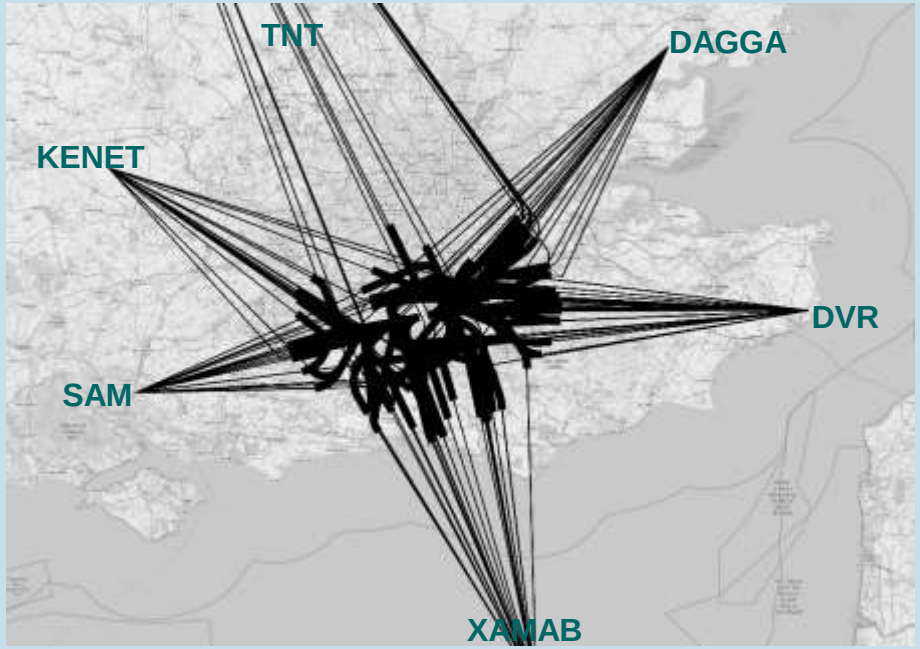
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

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.



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

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

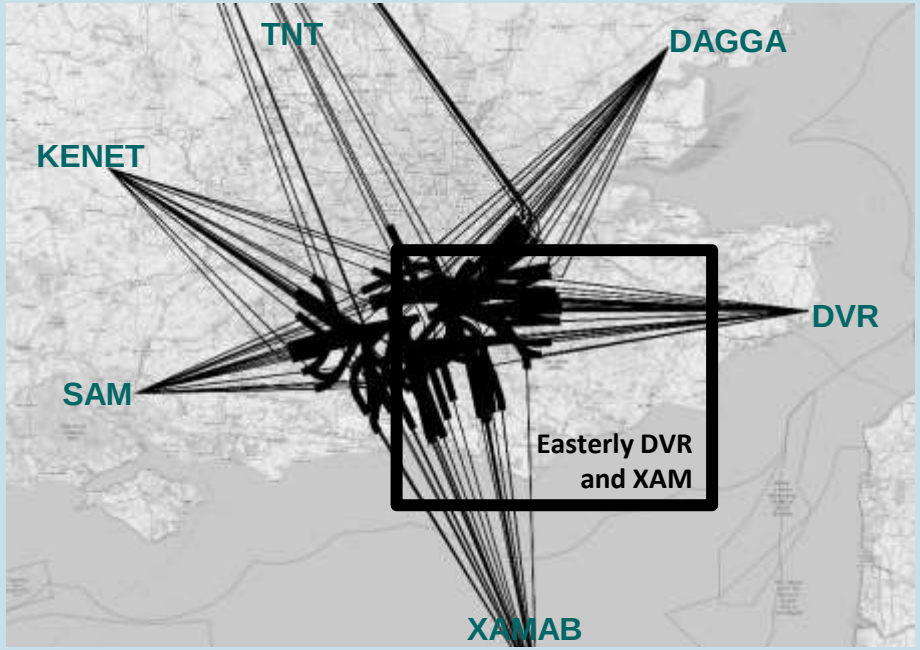
4 **Conduct the Design Principle Evaluation**

Departures: Option Evolution

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 +

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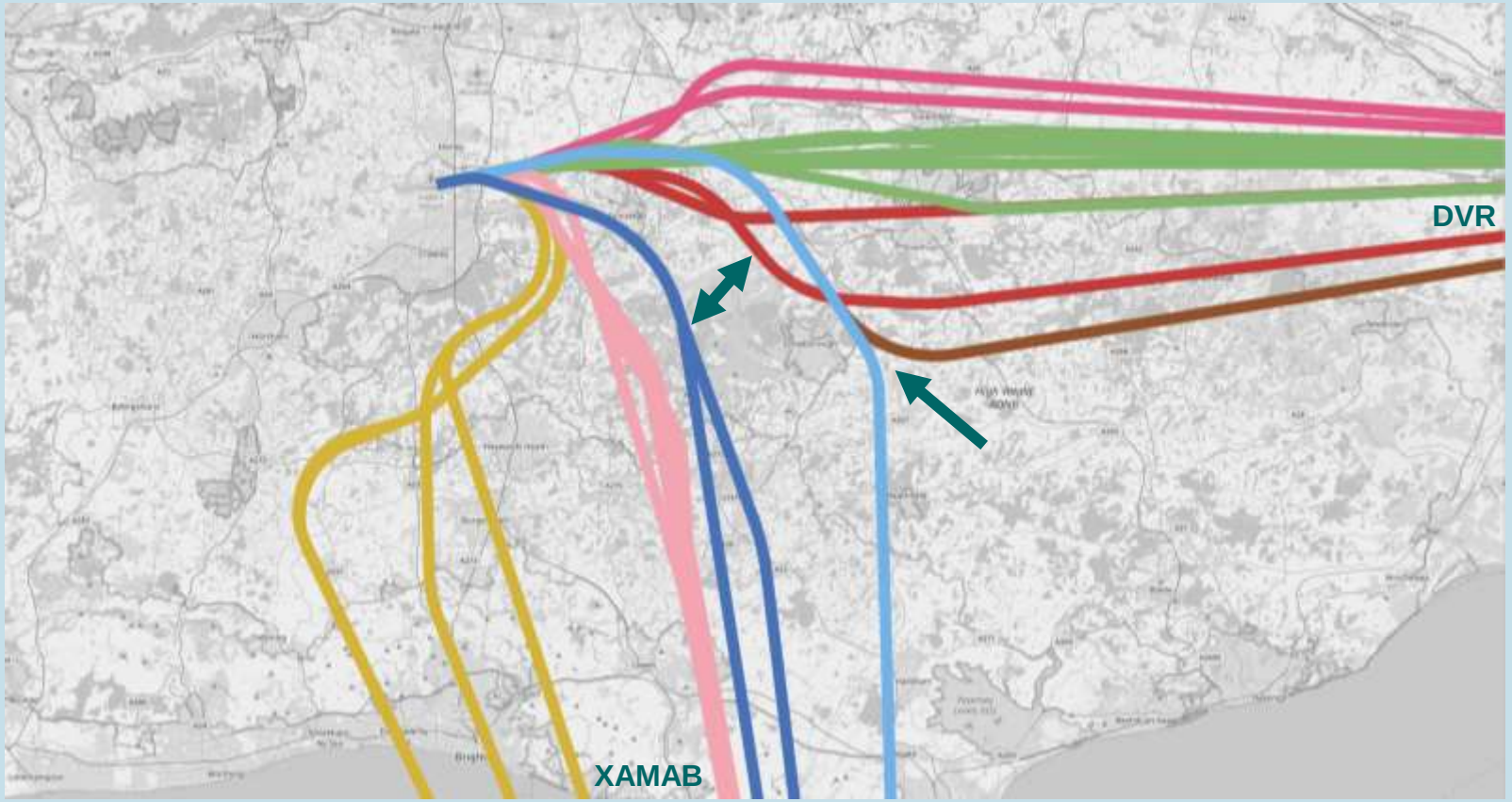
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

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.

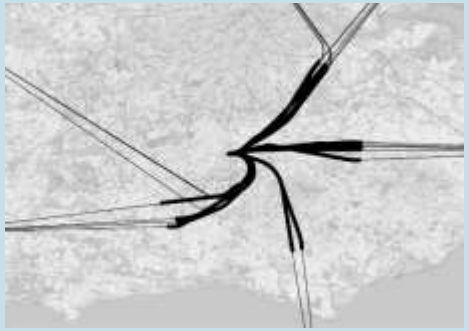
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

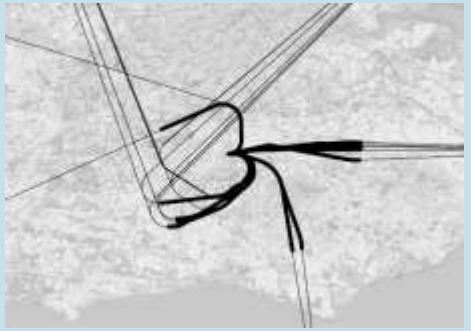
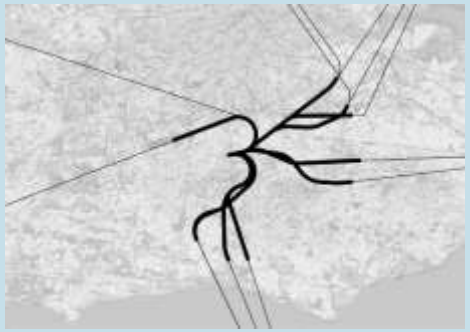
4 **Conduct the Design Principle Evaluation**

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

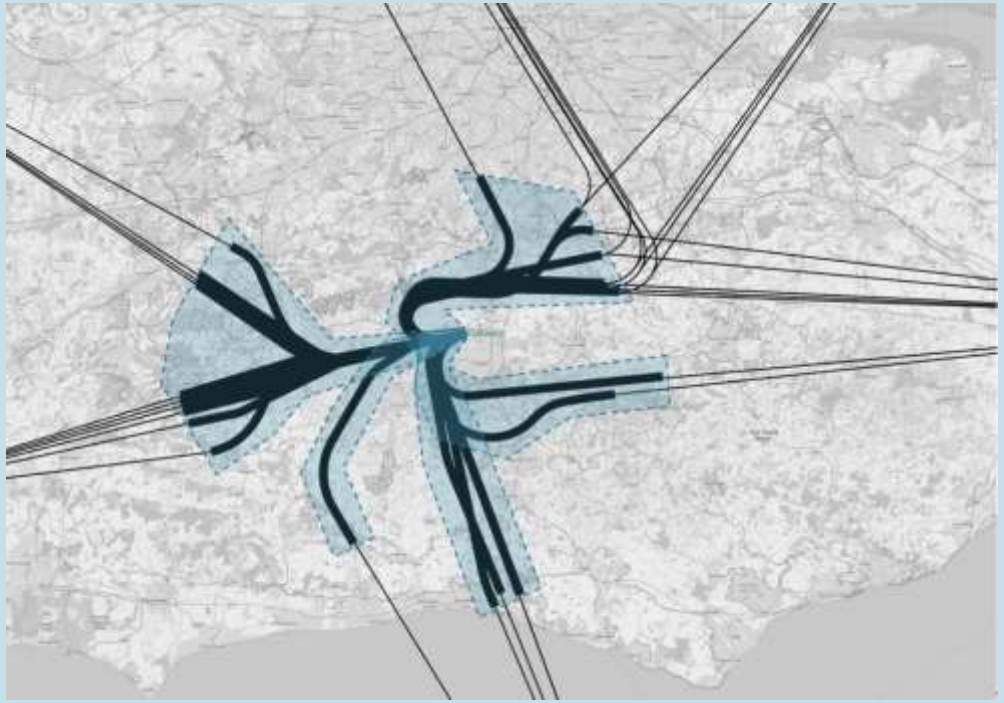
4 **Conduct the Design Principle Evaluation**

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: Option Evolution

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



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

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.

Easterly Departure Options

OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

5 Options for IOA

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

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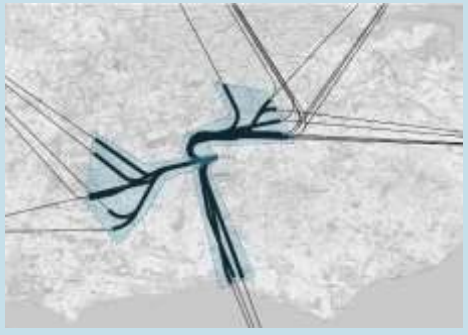
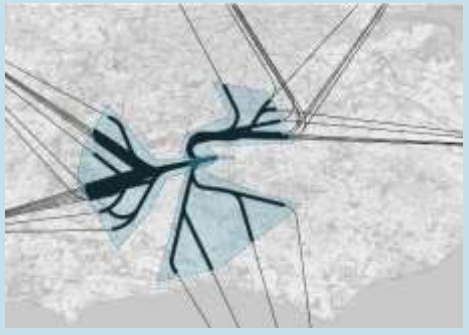
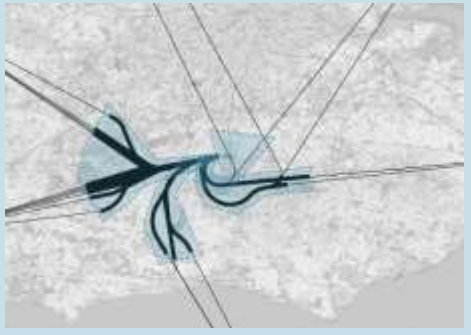
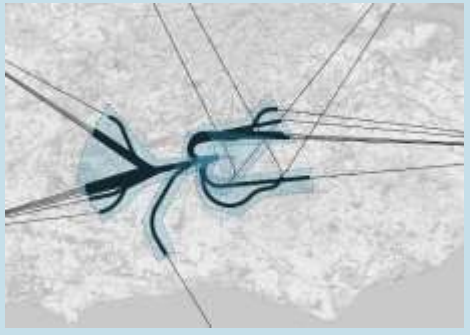
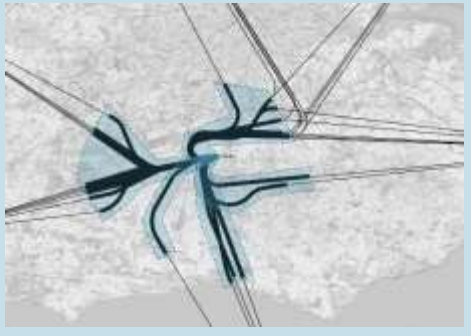
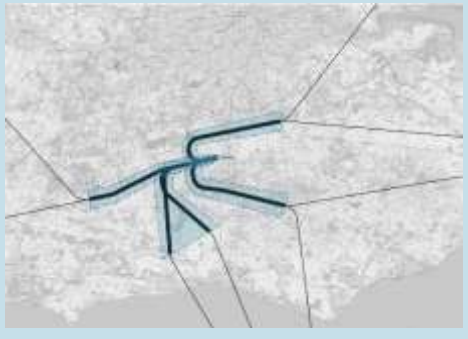
Westerly Departure Options


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

INITIAL OPTIONS APPRASIAL OVERVIEW

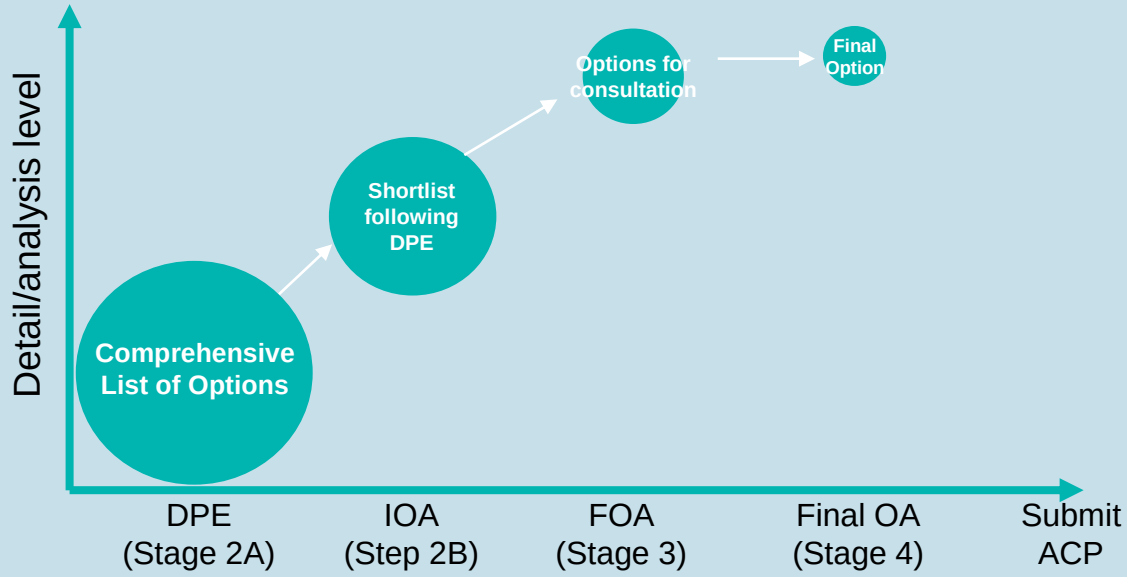
5 **Initial Options Appraisal (IOA)**

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

STAKEHOLDER ENGAGEMENT REPORT UPDATE

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

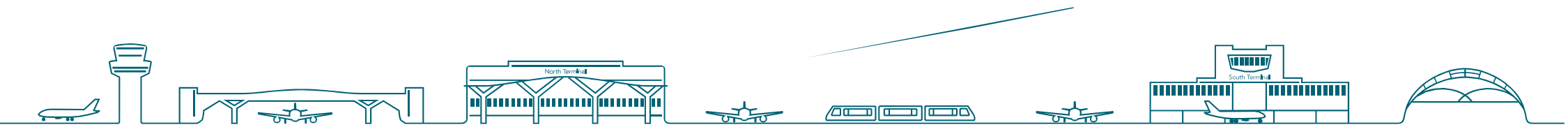
- Thank you for participating in Gatwick's Airspace Change Proposal (ACP) to redesign the airport's arrival and departure routes.
- If you have any questions or comments, please don't hesitate to contact us via LGWairspace.FASIS@gatwickairport.com

YOUR LONDON AIRPORT Gatwick

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

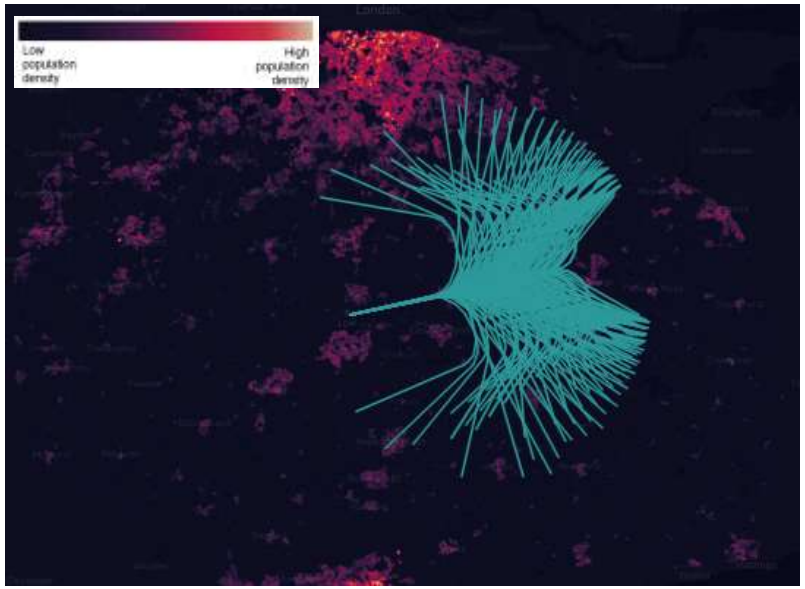
(DP2 is inherent in all options and DP4 is inherent to all arrivals options)

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

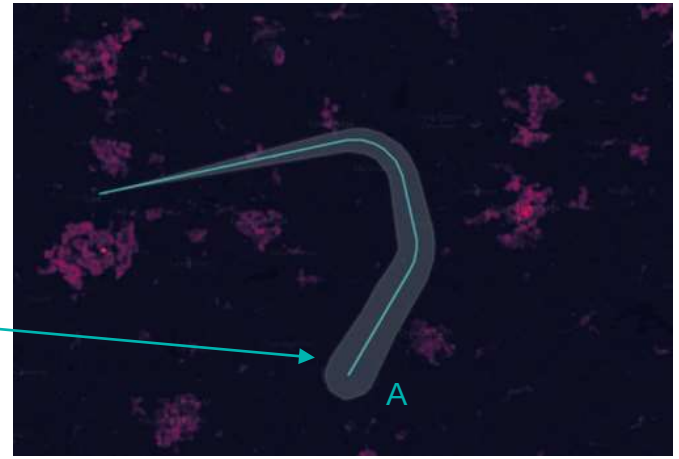
- The data indicated that the best notional flight path for population overflown between 0-7000ft overflew 6,233 people.
- The worst performing notional flight path overflew 112,020 people.
- When looking at AONB overflown, the best performing path overflew 75.15km^2 of AONB whereas the worst performing path overflew 77.9km^2.

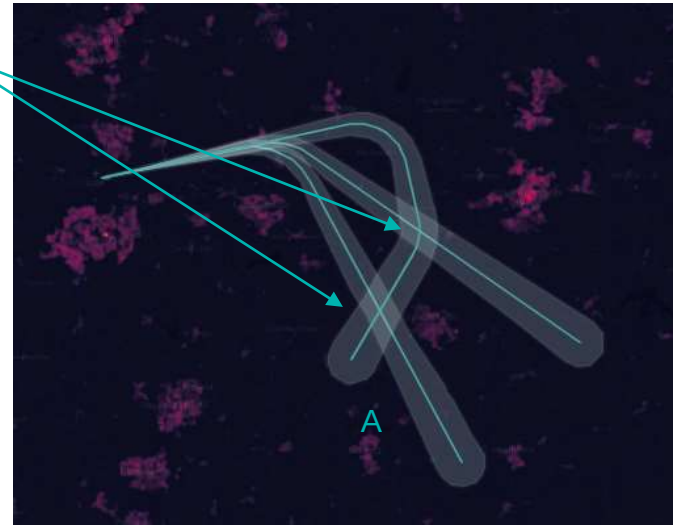
Total Number of Westerly Arrival Notional Flight Paths	198

	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

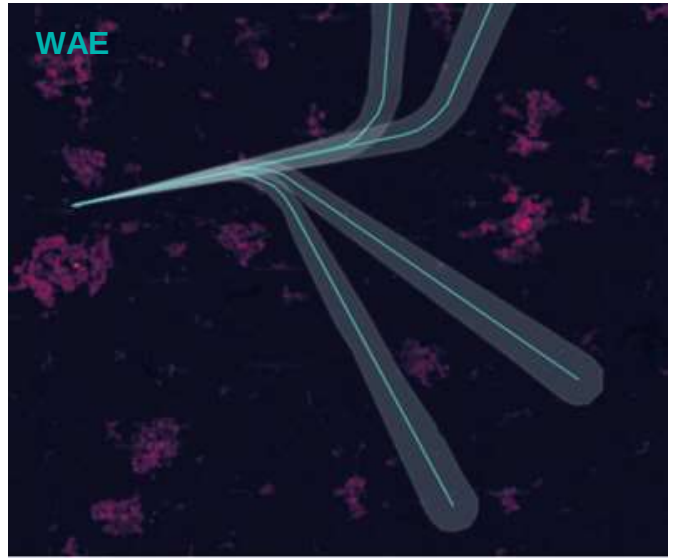
- The intention of these options is to offer multiple routes that can be alternated for respite. At this stage, we assume the majority of traffic will arrive from the south, and will be split equally down each southerly respite route.
- To start building the options, we took the best performing flight 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.



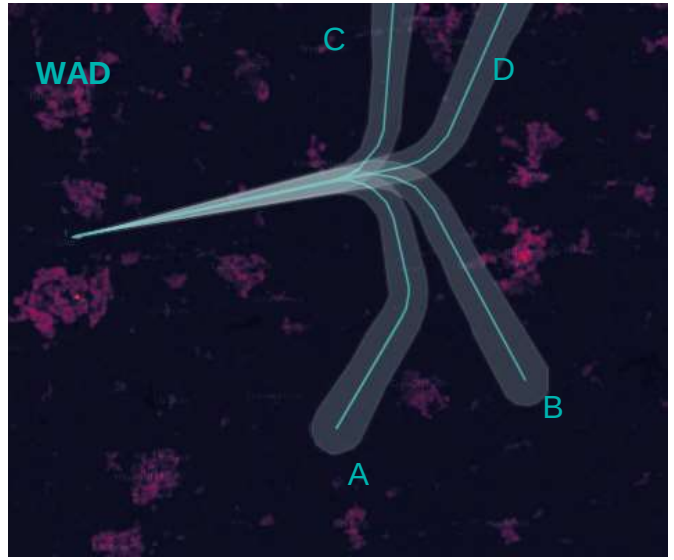


Appendix A: Worked Example

- 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.

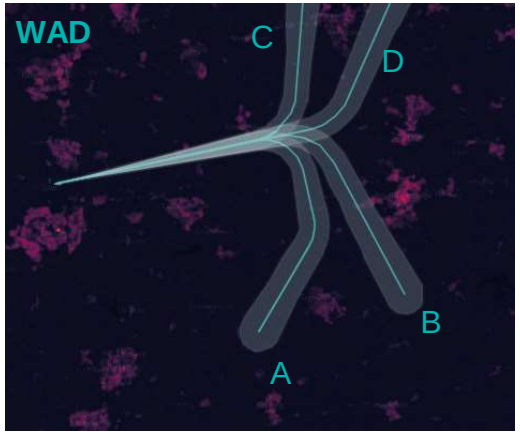
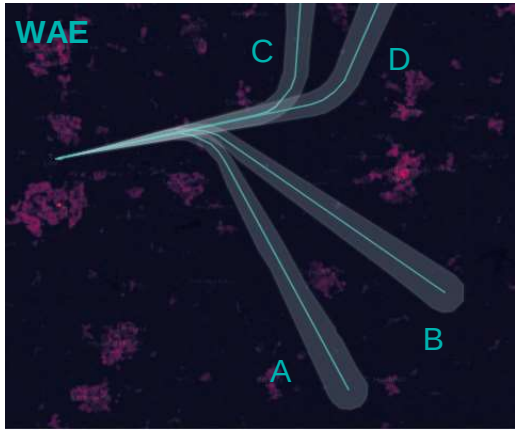


- Looking back to the original route A, we opened up the data within the database to identify a notional flight path that could be operated alongside route A in a respite configuration.
- This identified route B which overflies 10,654 people.
- The two arrival routes from the north remained the same 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	

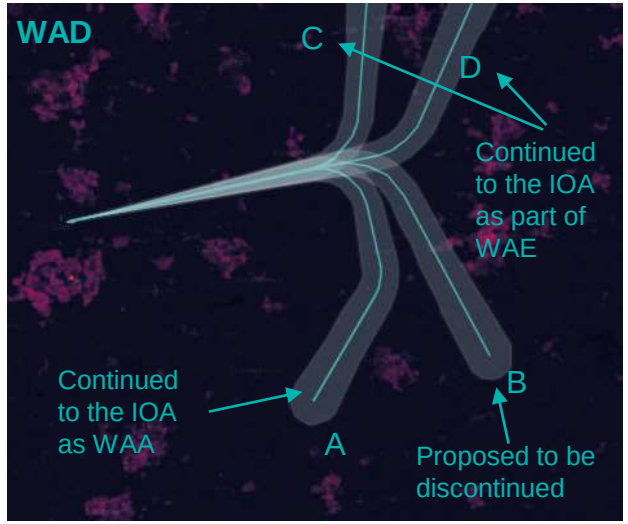
Appendix A: Worked Example

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)

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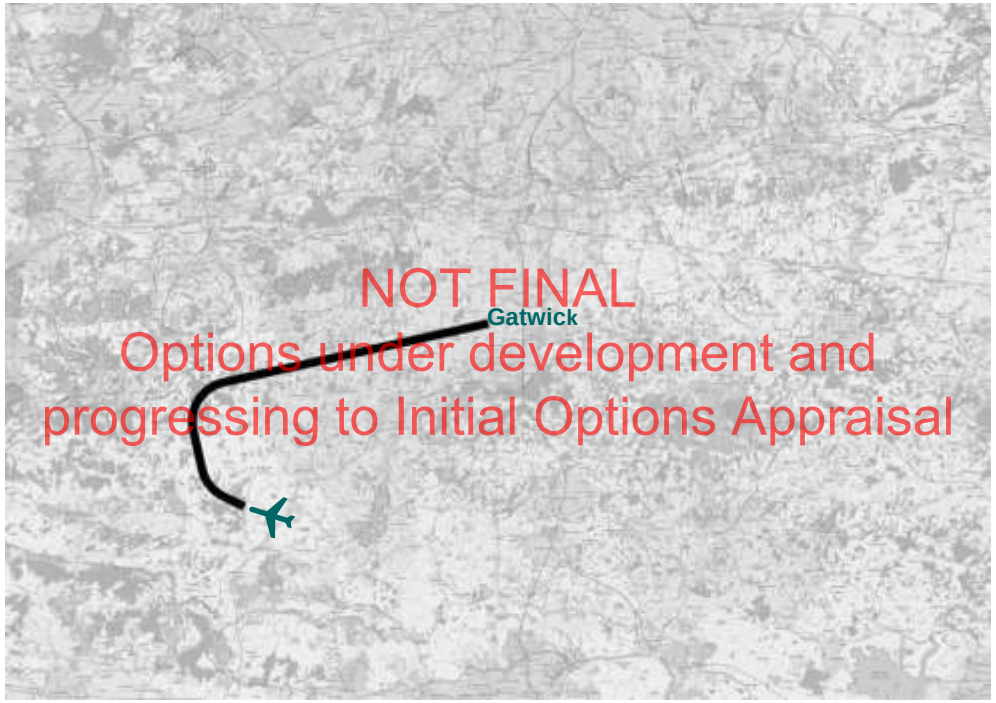
OVERVIEW OF THE DESIGN PRINCIPLE EVALUATION APPROACH AND OUTPUTS

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 3° 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.



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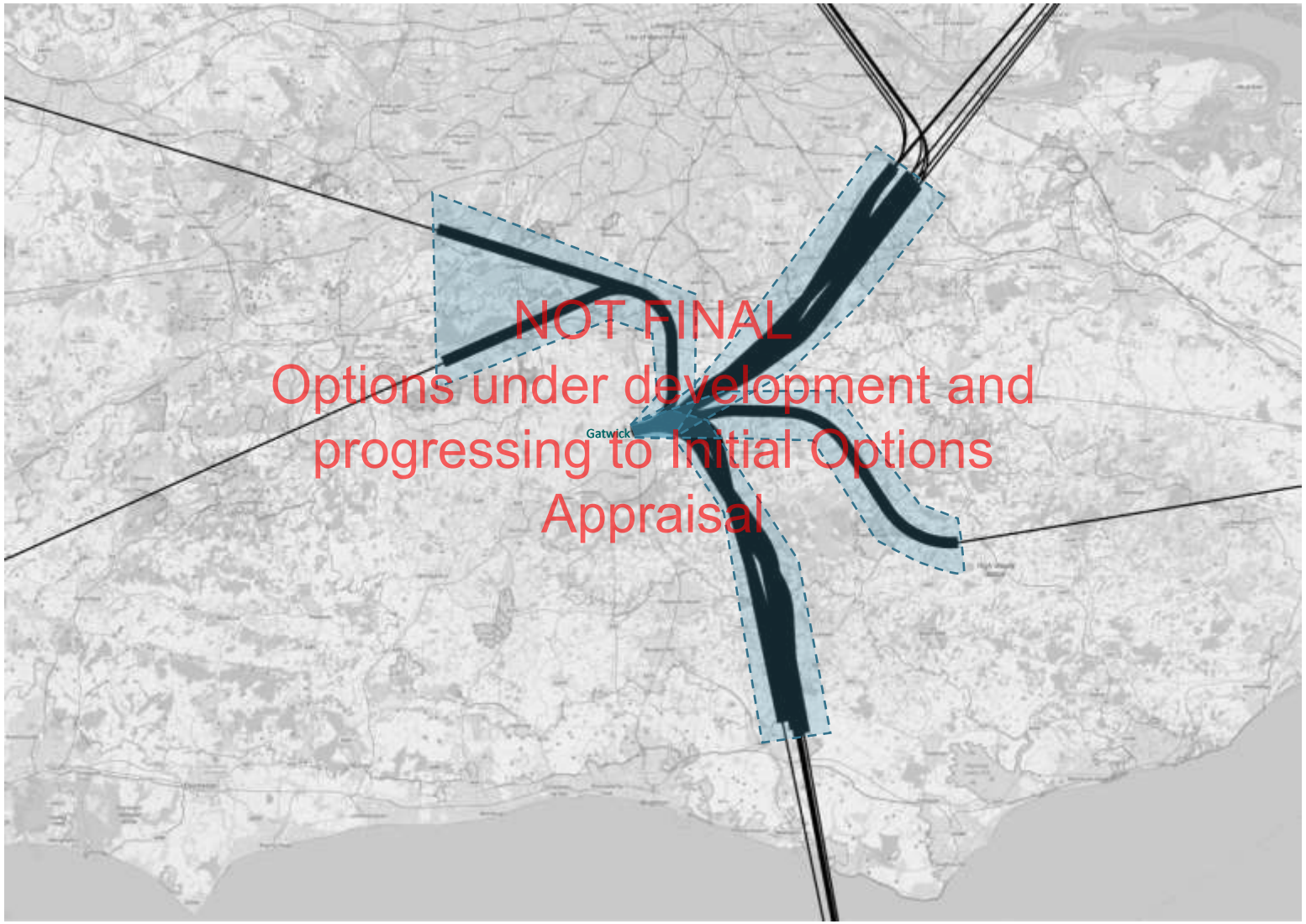
7000-0 (3° descent)

Departures

Departures Easterly System 1



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

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Departures Easterly System 2

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

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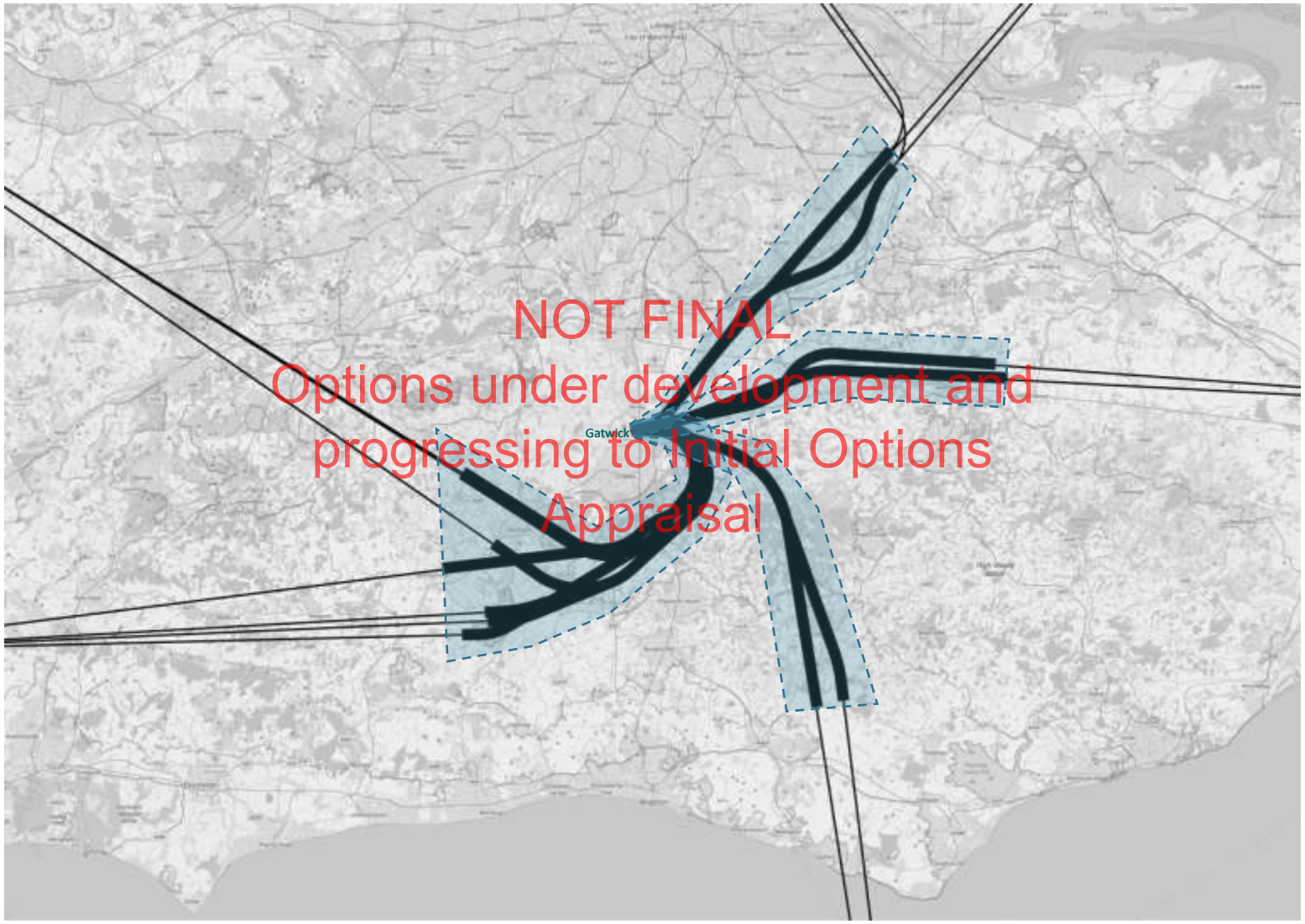
Departures Easterly System 3



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

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Departures Easterly System 4

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

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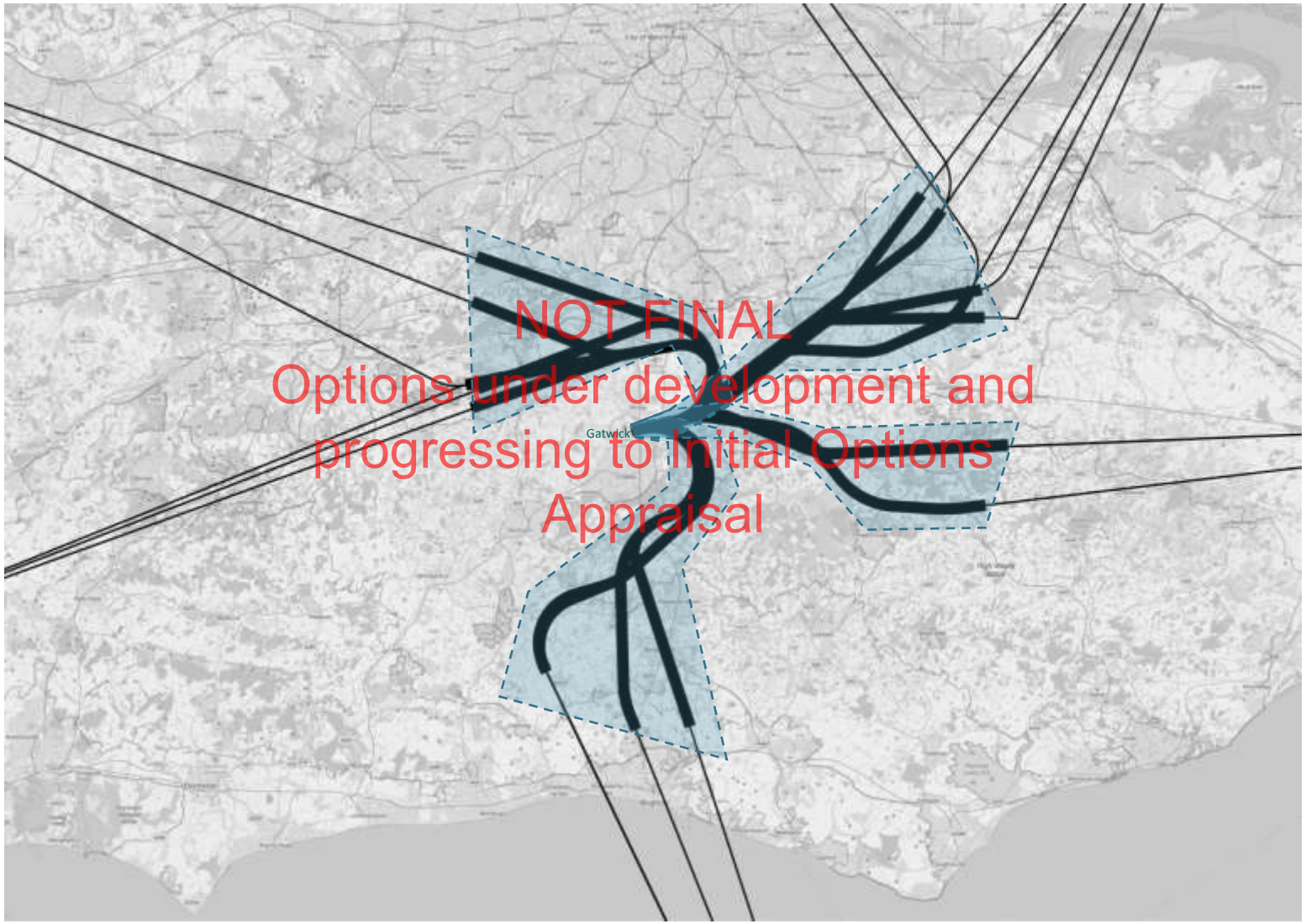
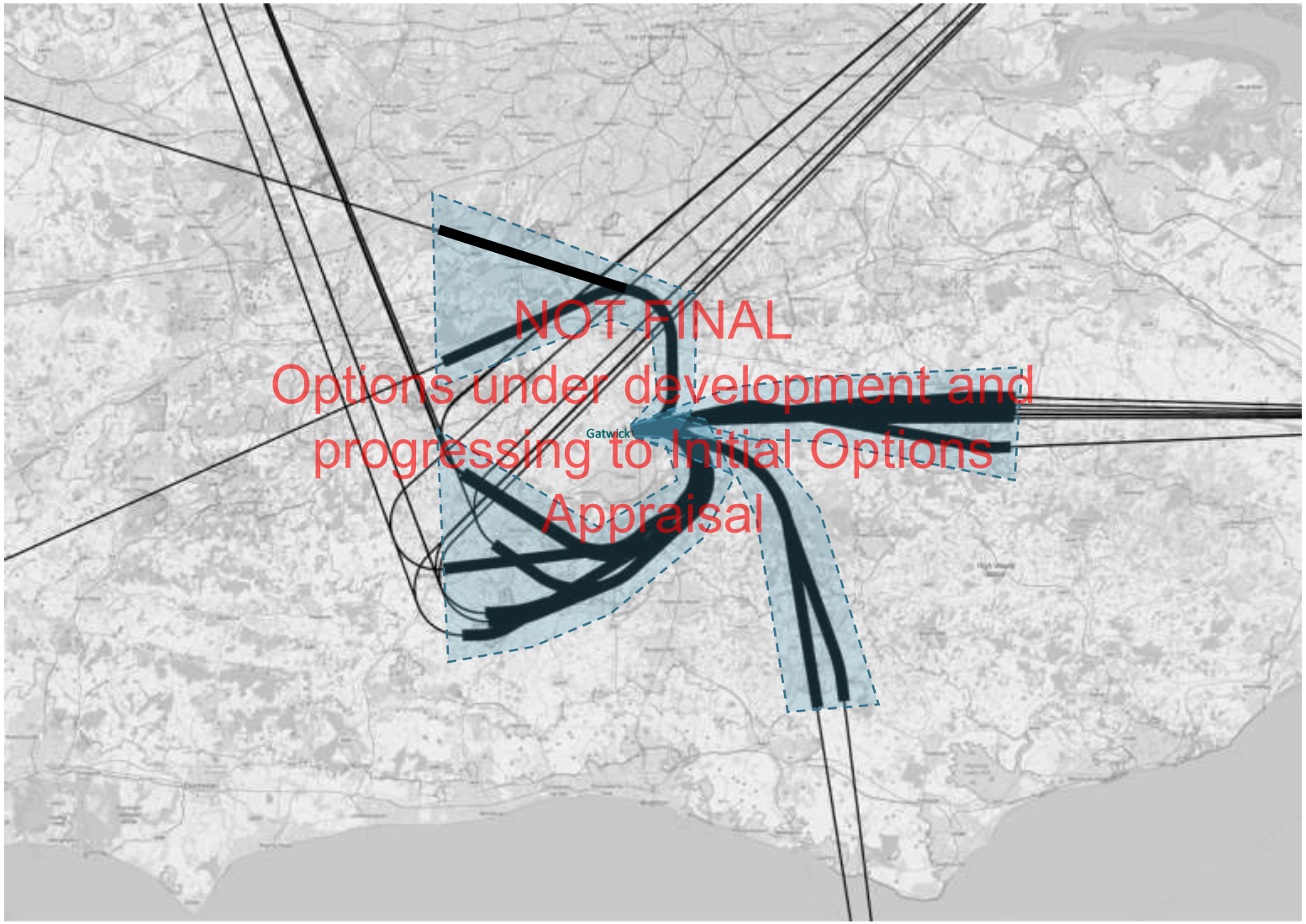
Departures Easterly System 5



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.

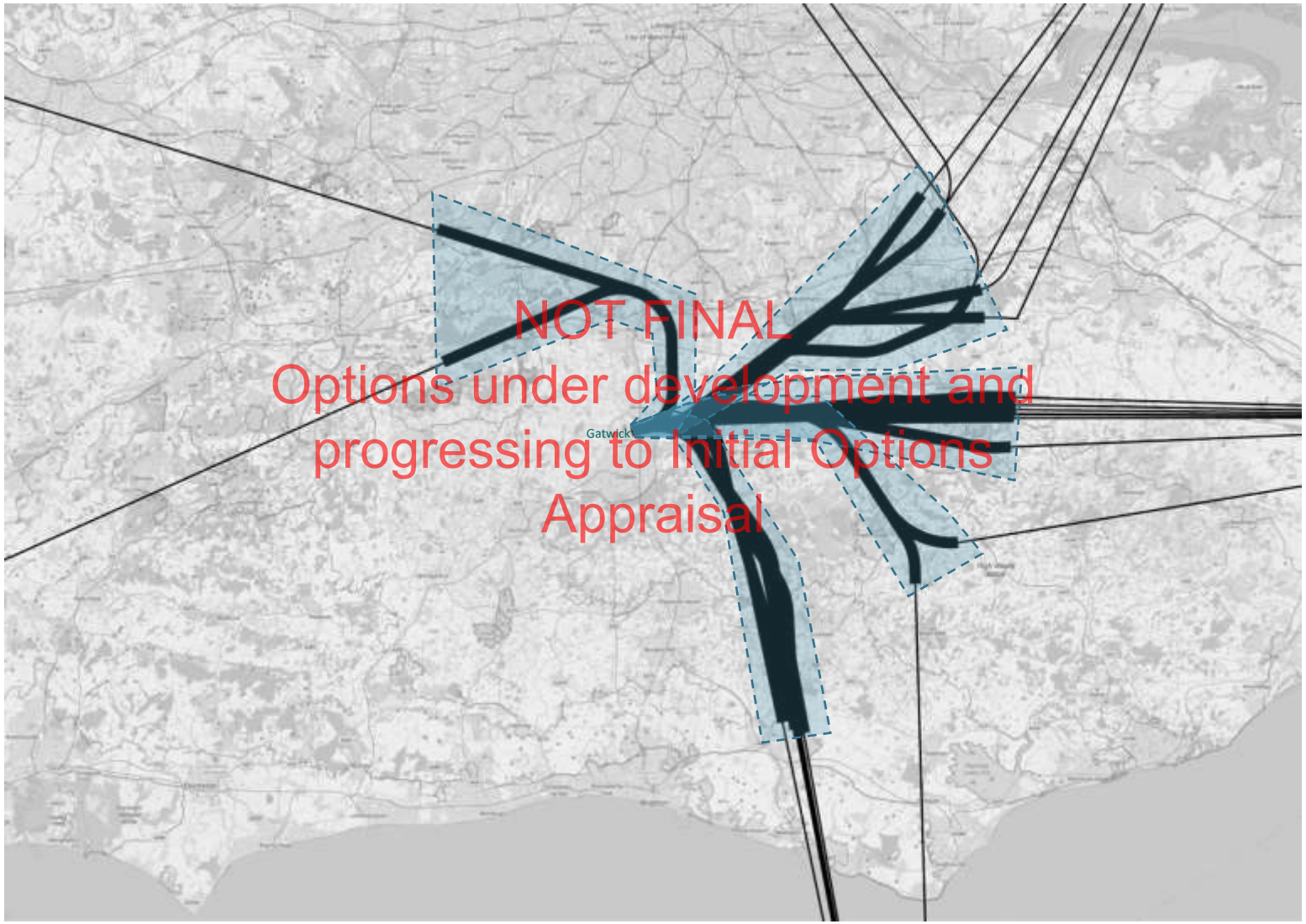
Departures Easterly System 6



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.

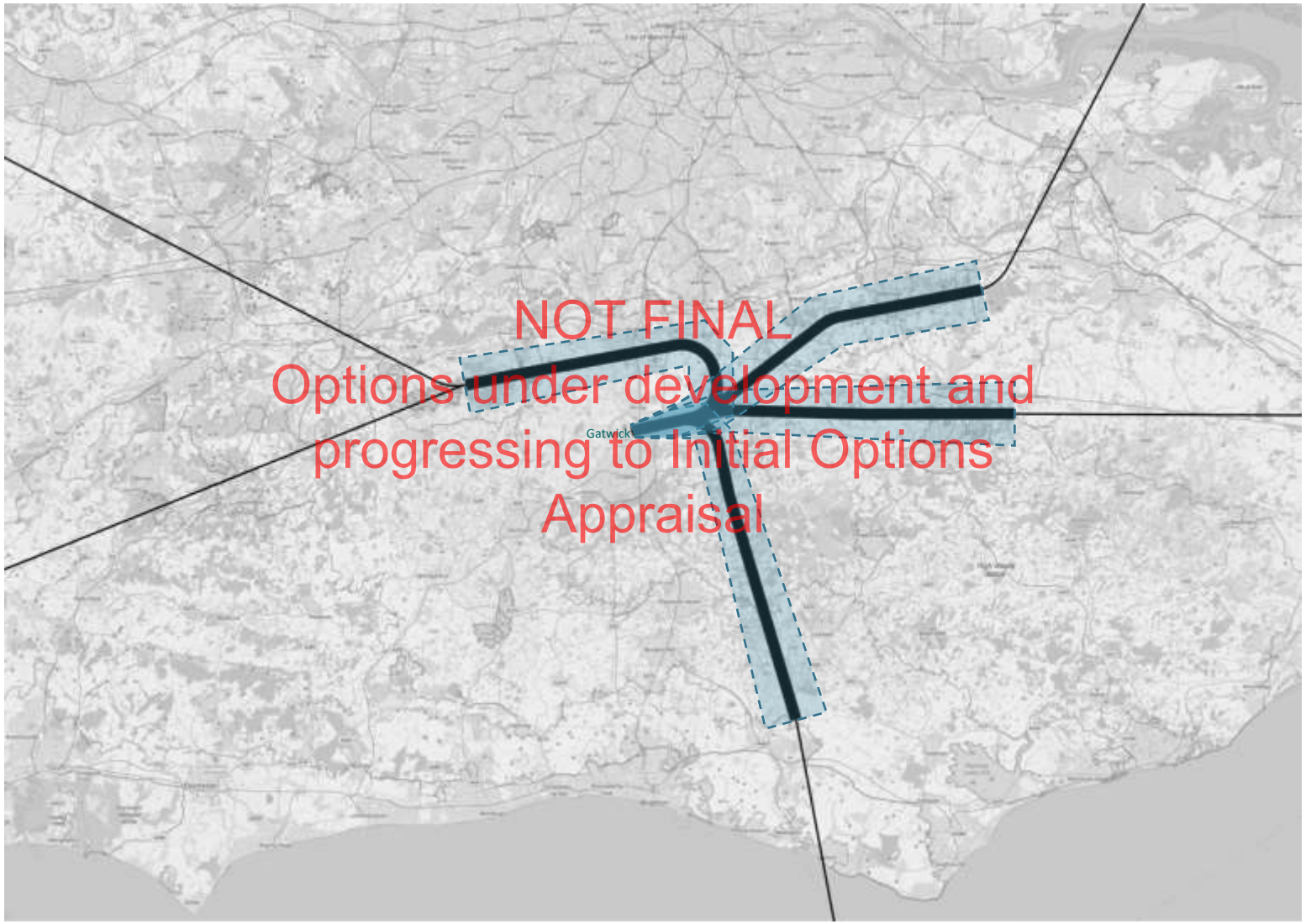
Departures Easterly System 7



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.

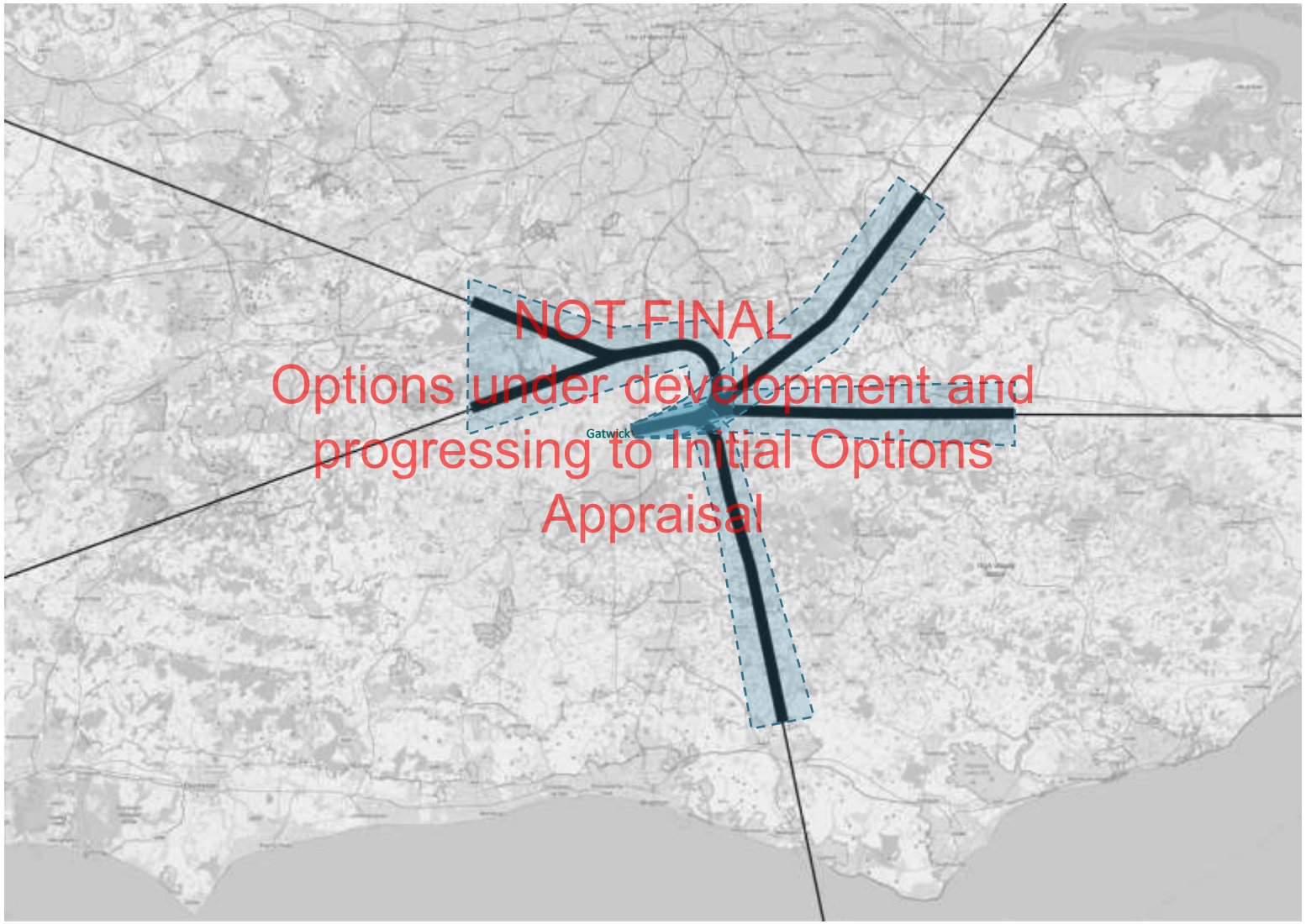
Departures Easterly System 8



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.

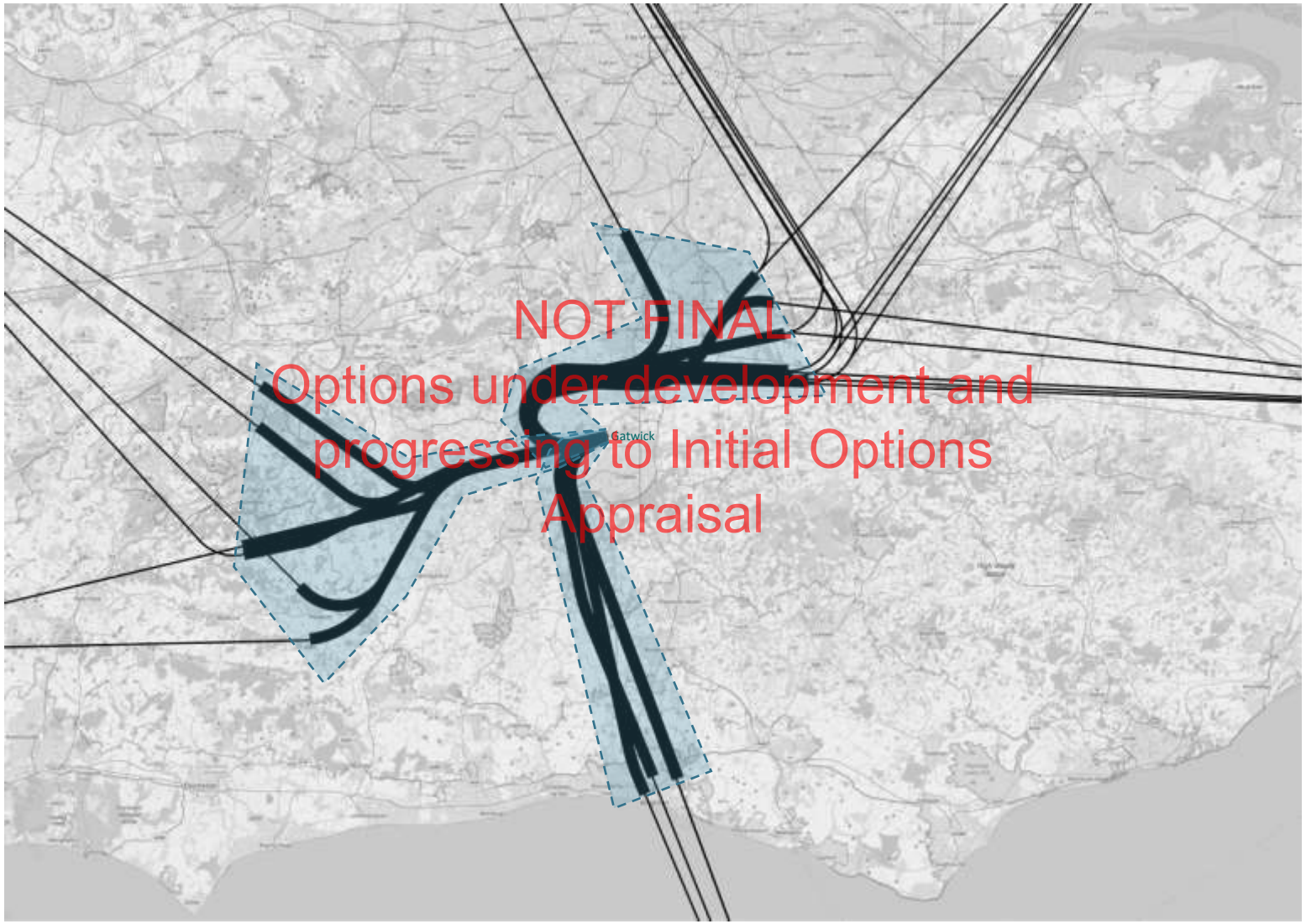
Departures Easterly System 9



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 +

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Departures Westerly System 2

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

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Departures
Westerly System 3

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

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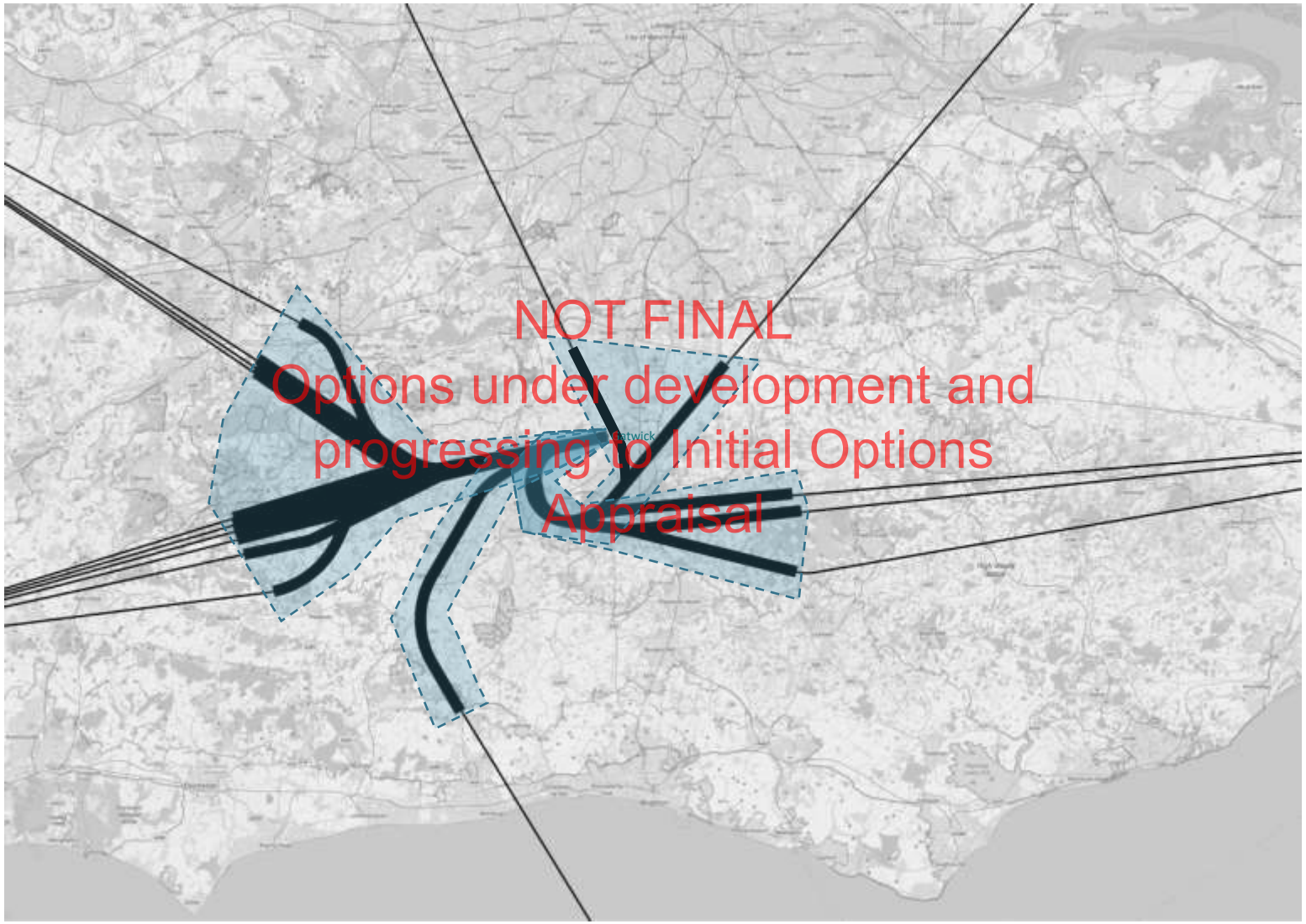
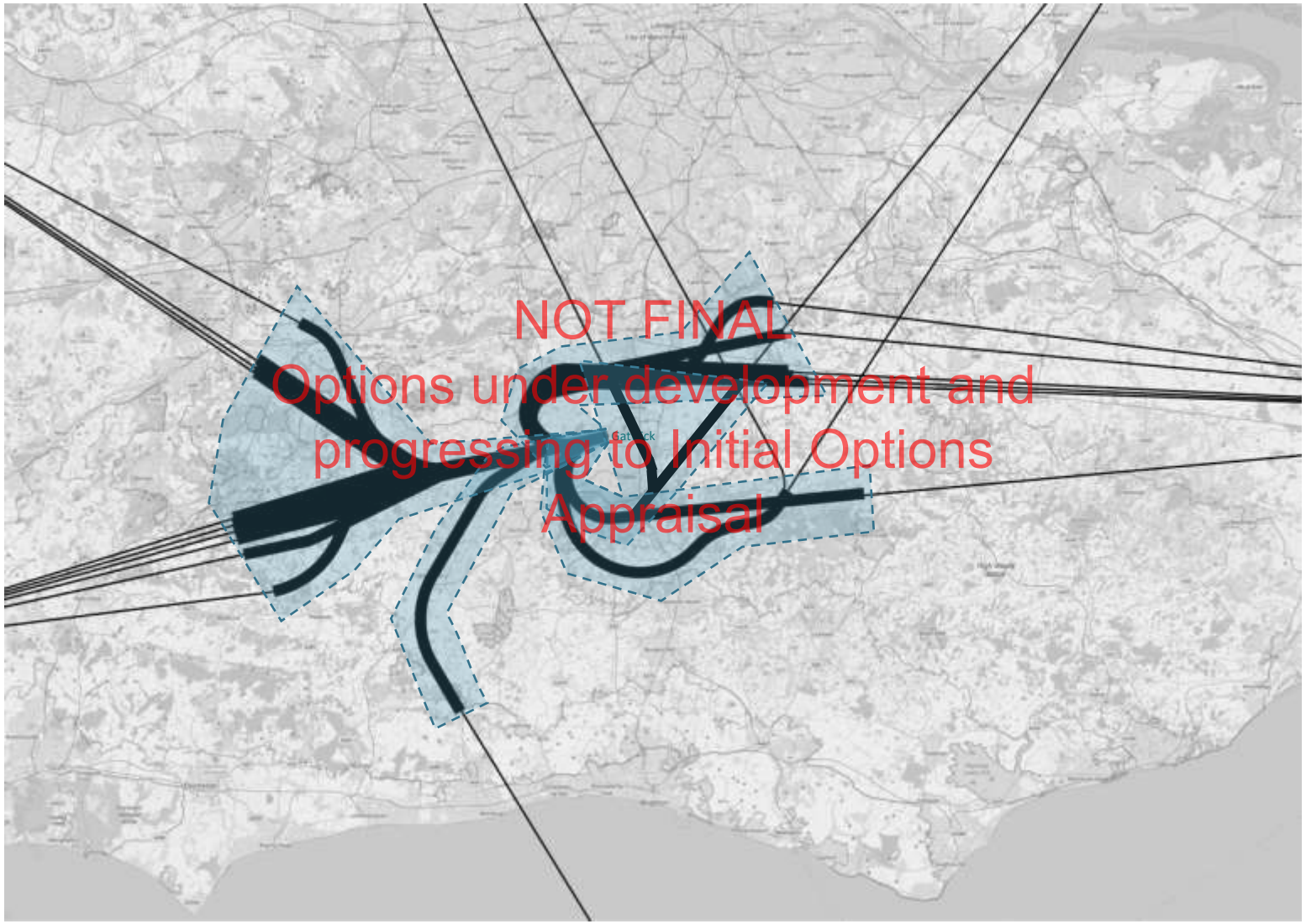
Departures
Westerly System 4



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.

Departures
Westerly System 6

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

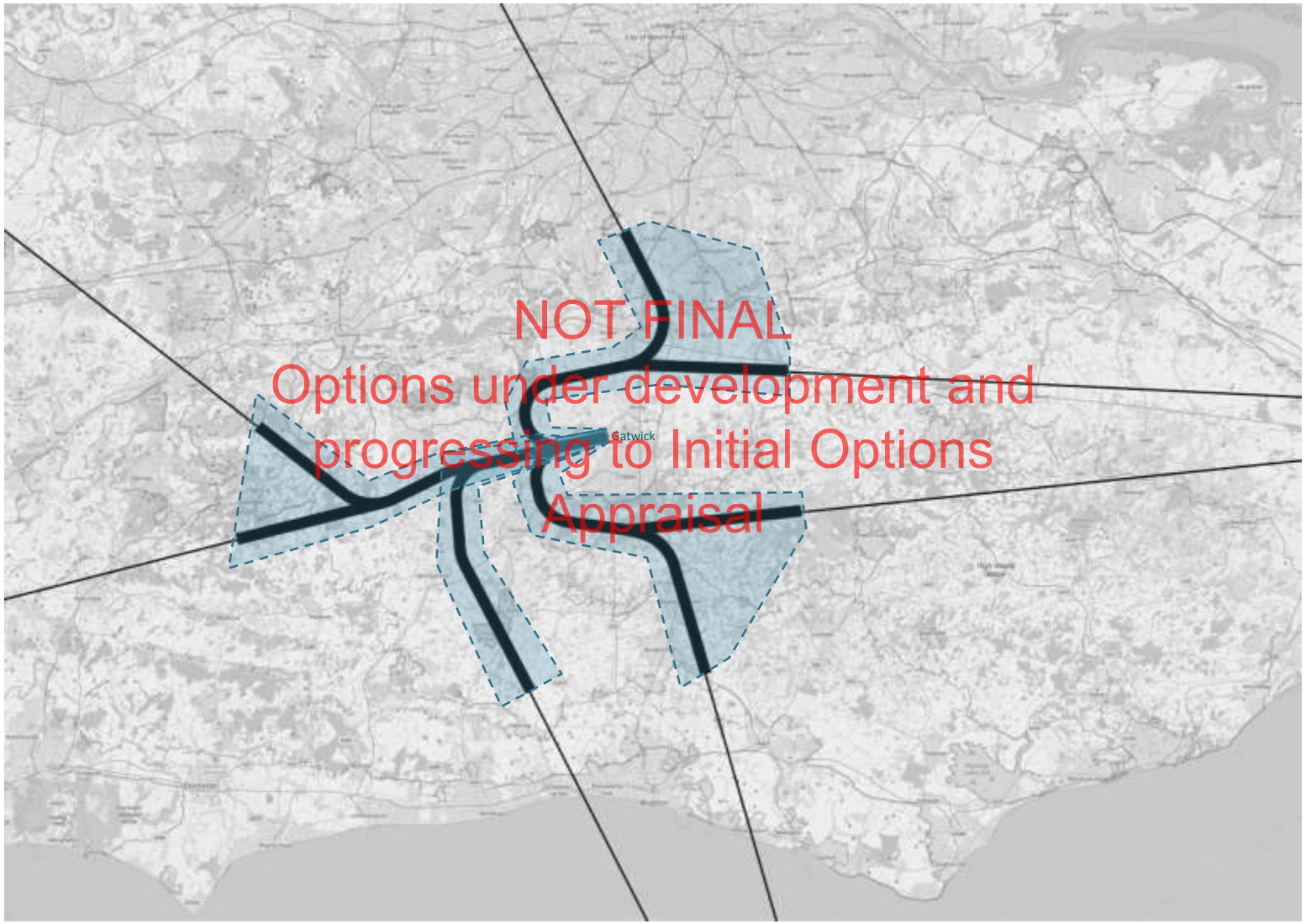
All airspace design options are subject to change throughout the airspace change process as options are matured in detail and refined in accordance with safety requirements, our design principles, our appraisals and stakeholder engagement and consultation.

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.

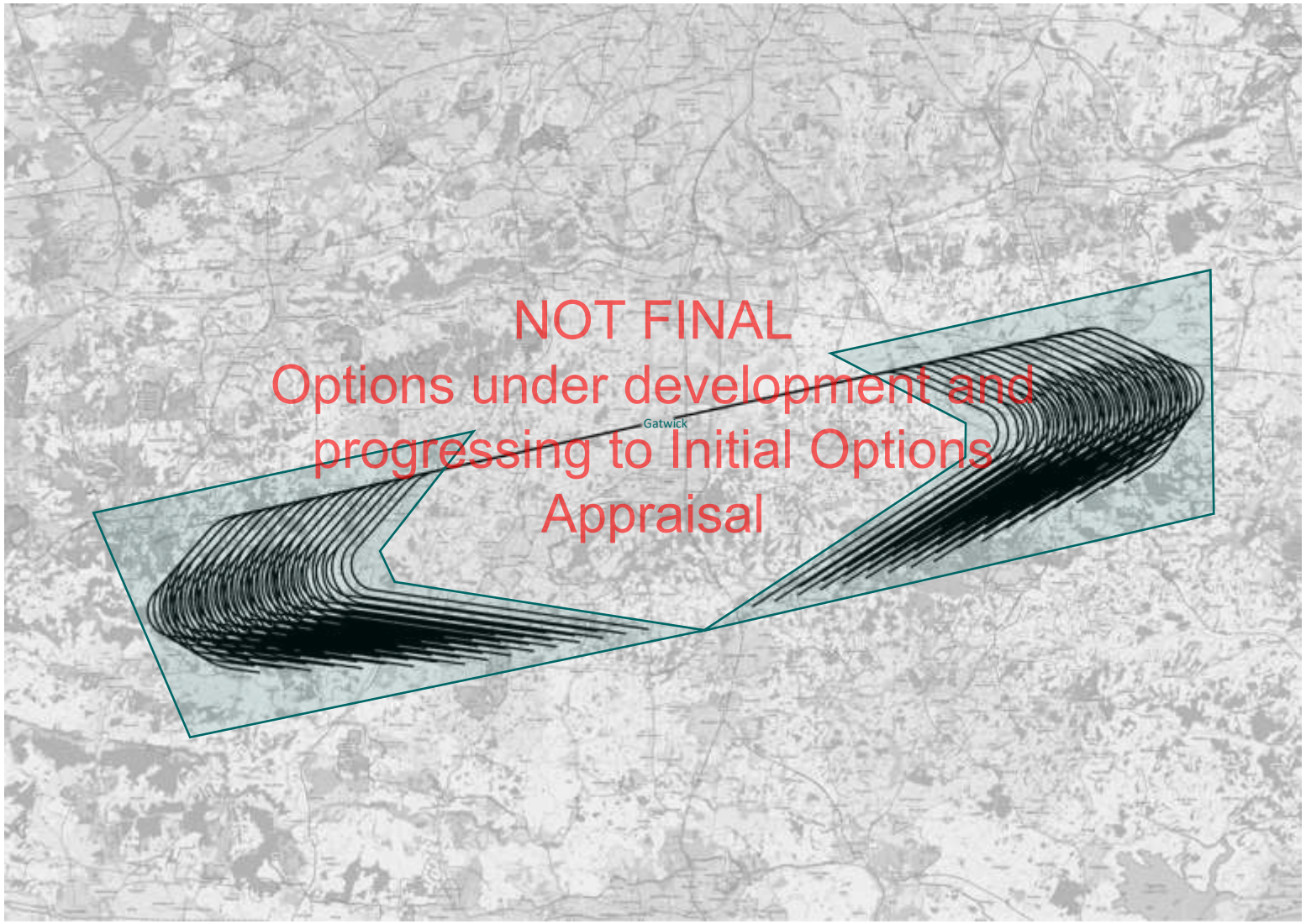
Arrivals

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

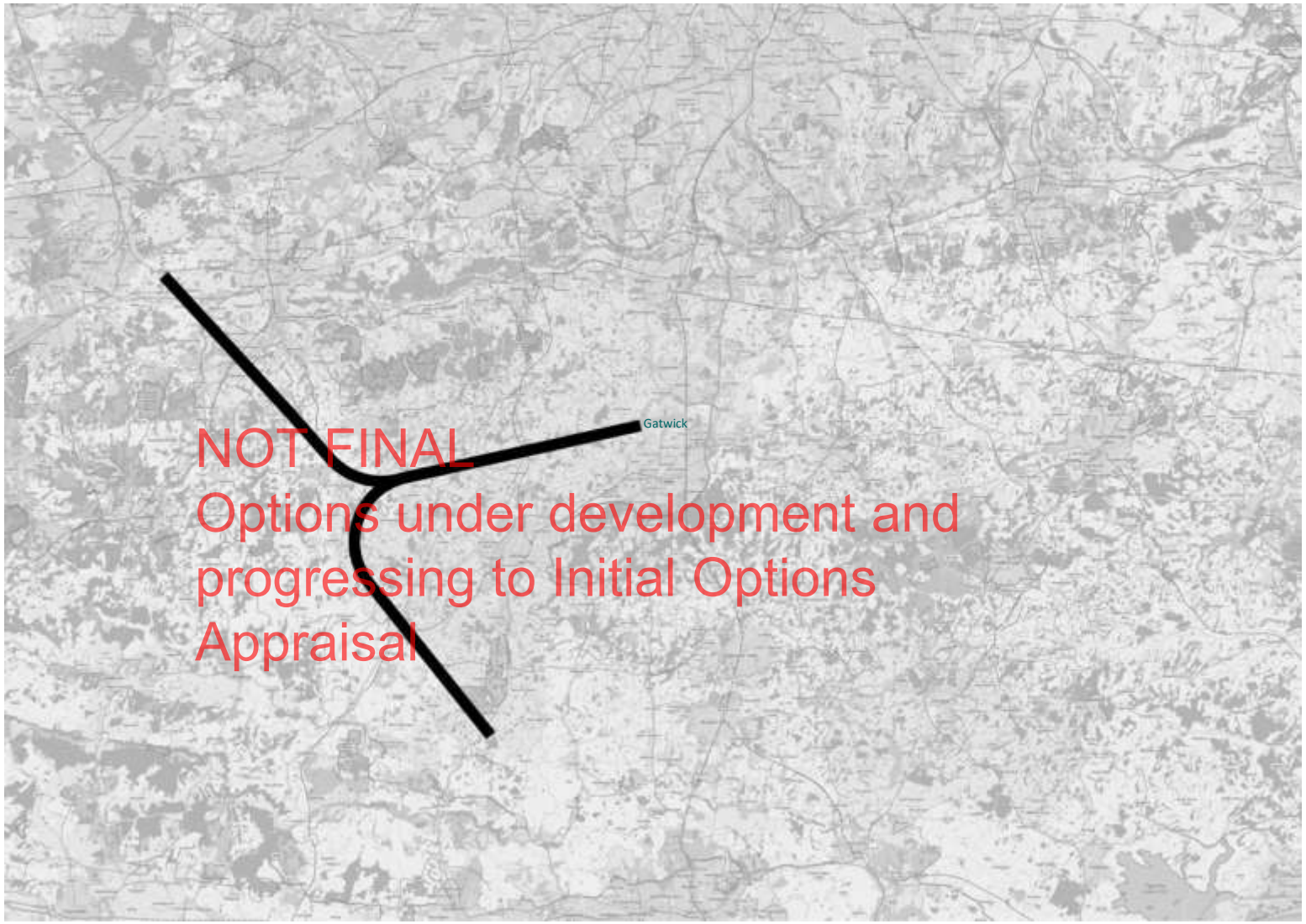
7000-0 (3º descent)

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.

Arrivals
EAF

Note: To be operated alongside an RMA

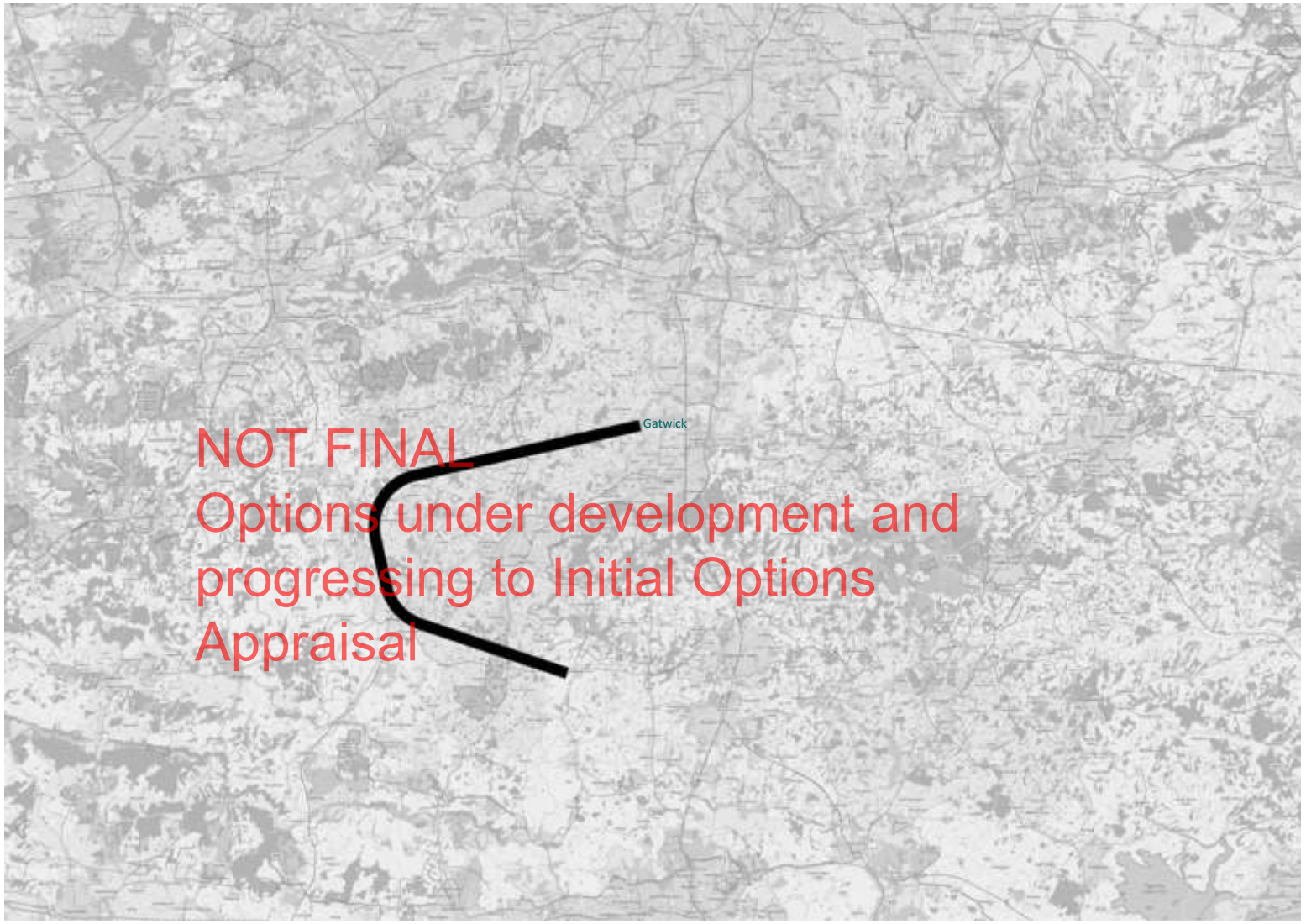
PBN arrival from the north on a tactical basis

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.

Arrivals
EAG

Note: To be operated alongside an RMA

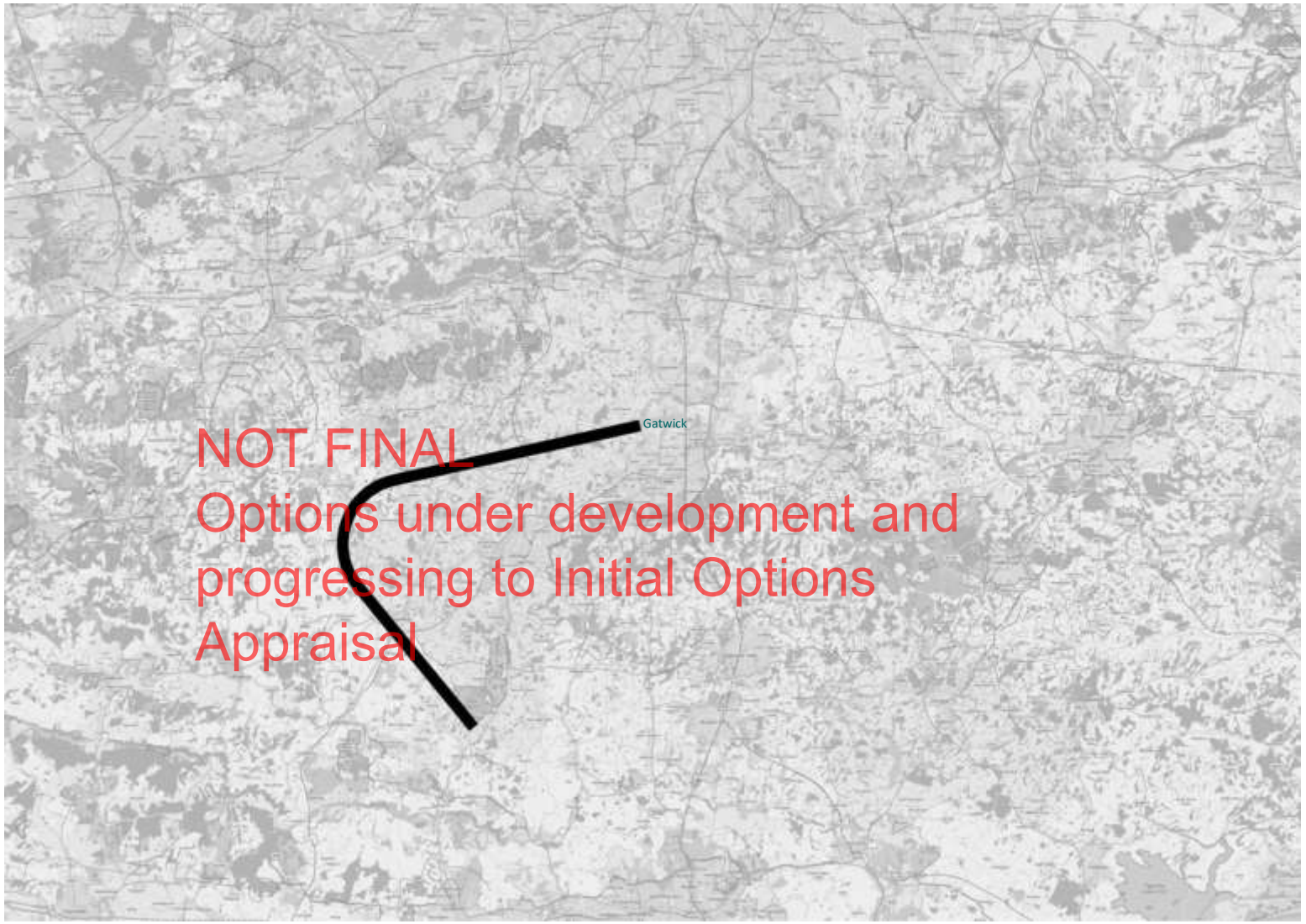


7000-0 (3º descent)

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.

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

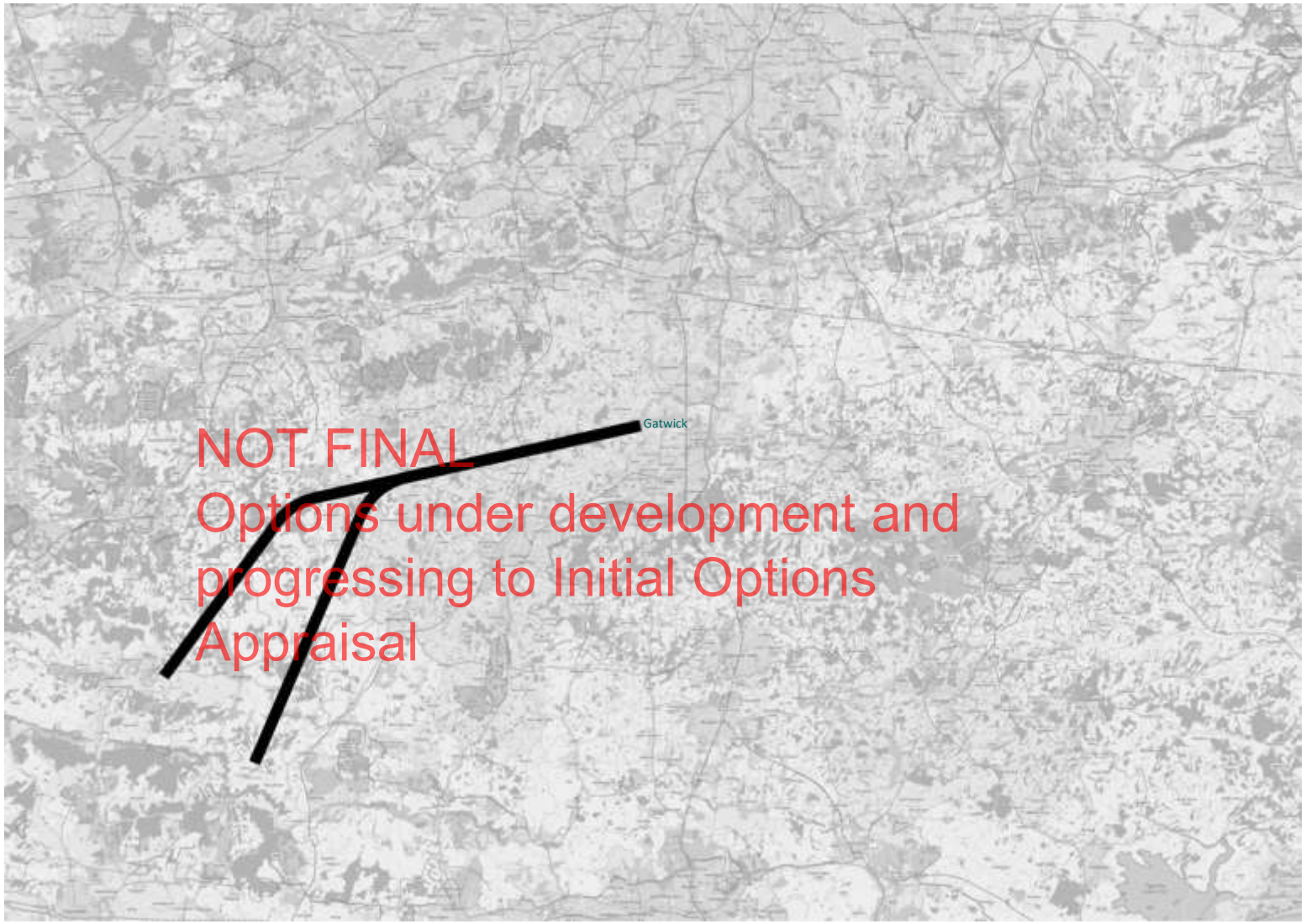
7000-0 (3º descent)

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)

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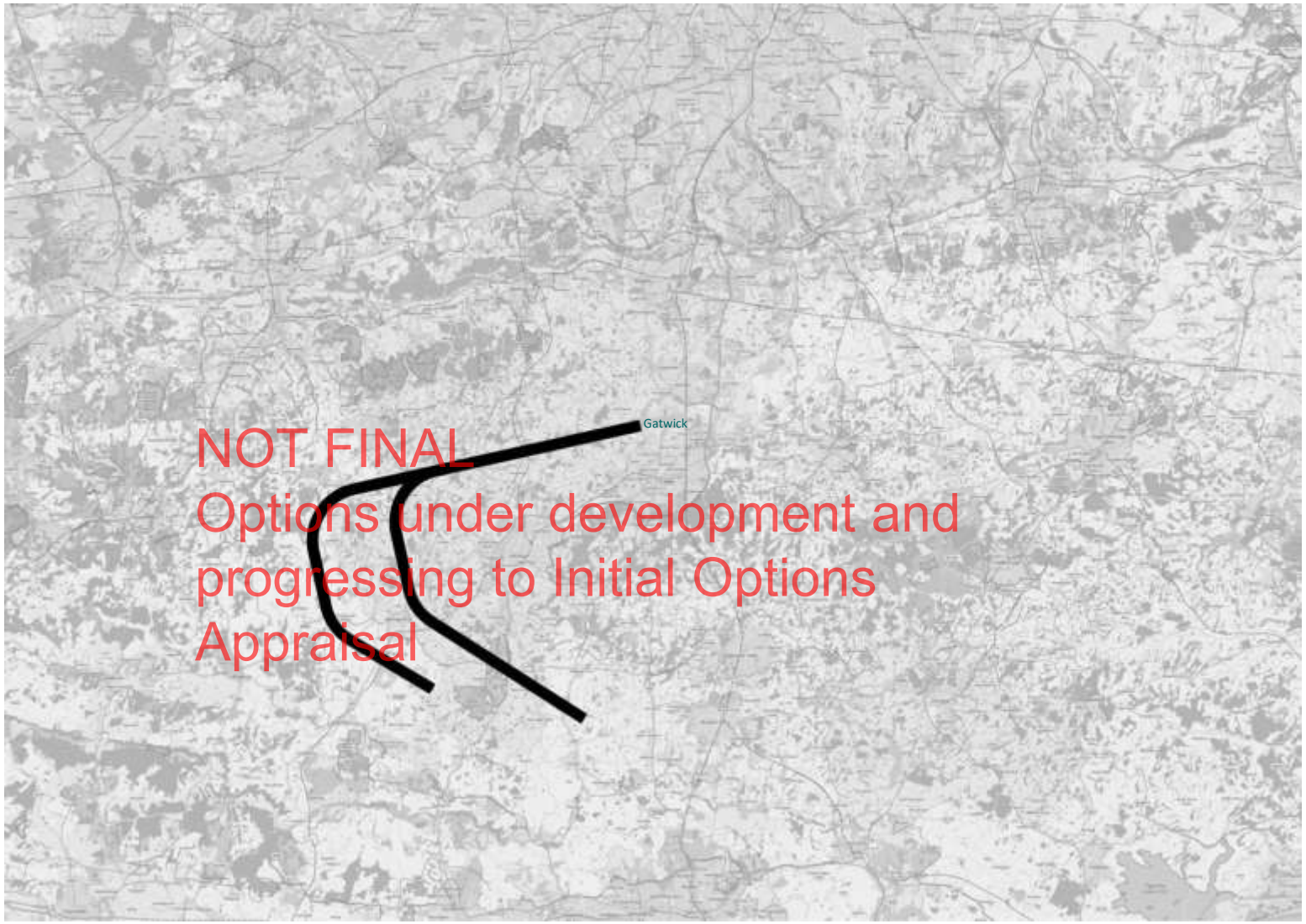
Arrivals
EAL

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally



7000-0 (3^{o} descent)

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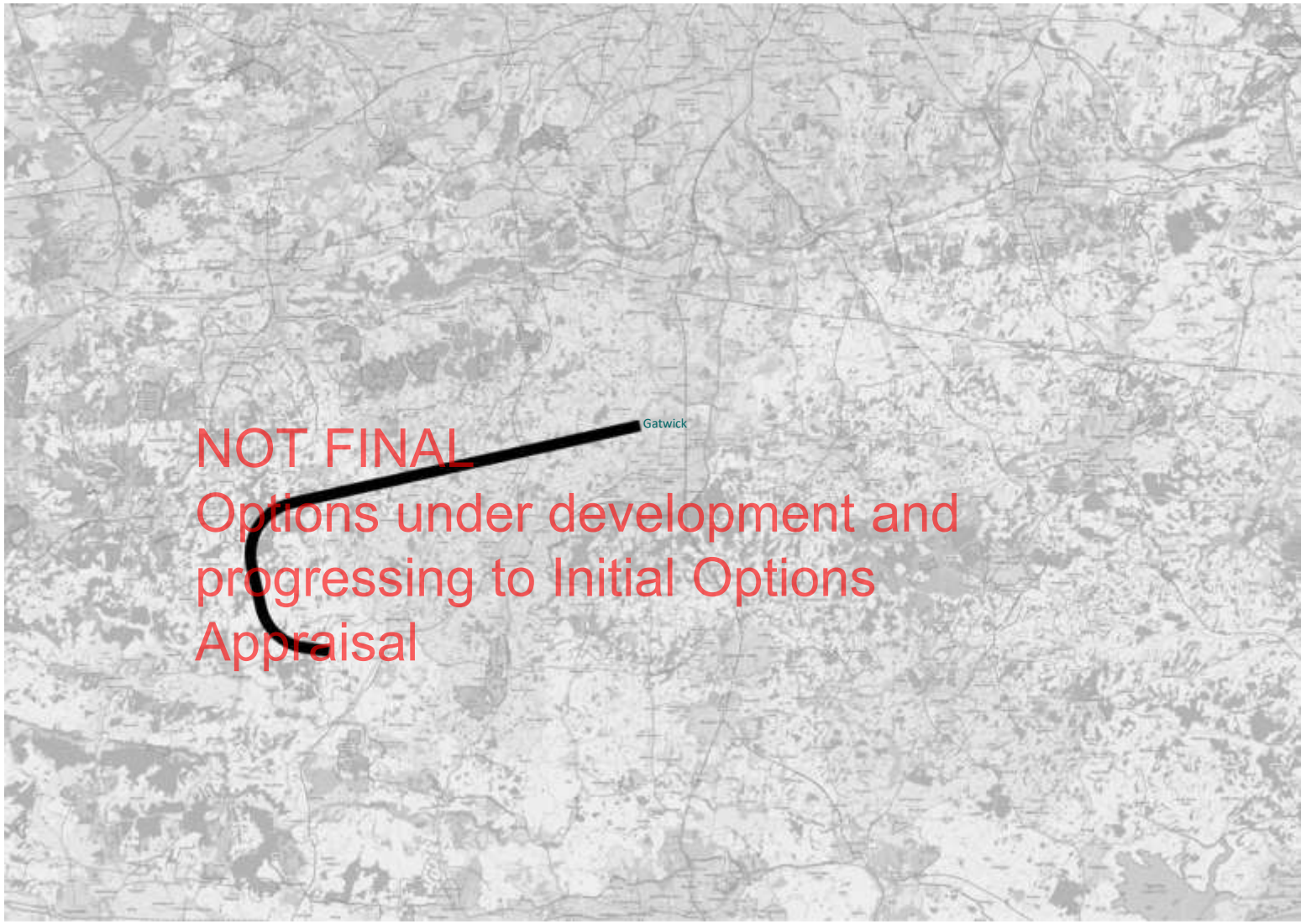
Arrivals
EAM

Note: To be operated alongside an RMA



7000-0 (3º descent)

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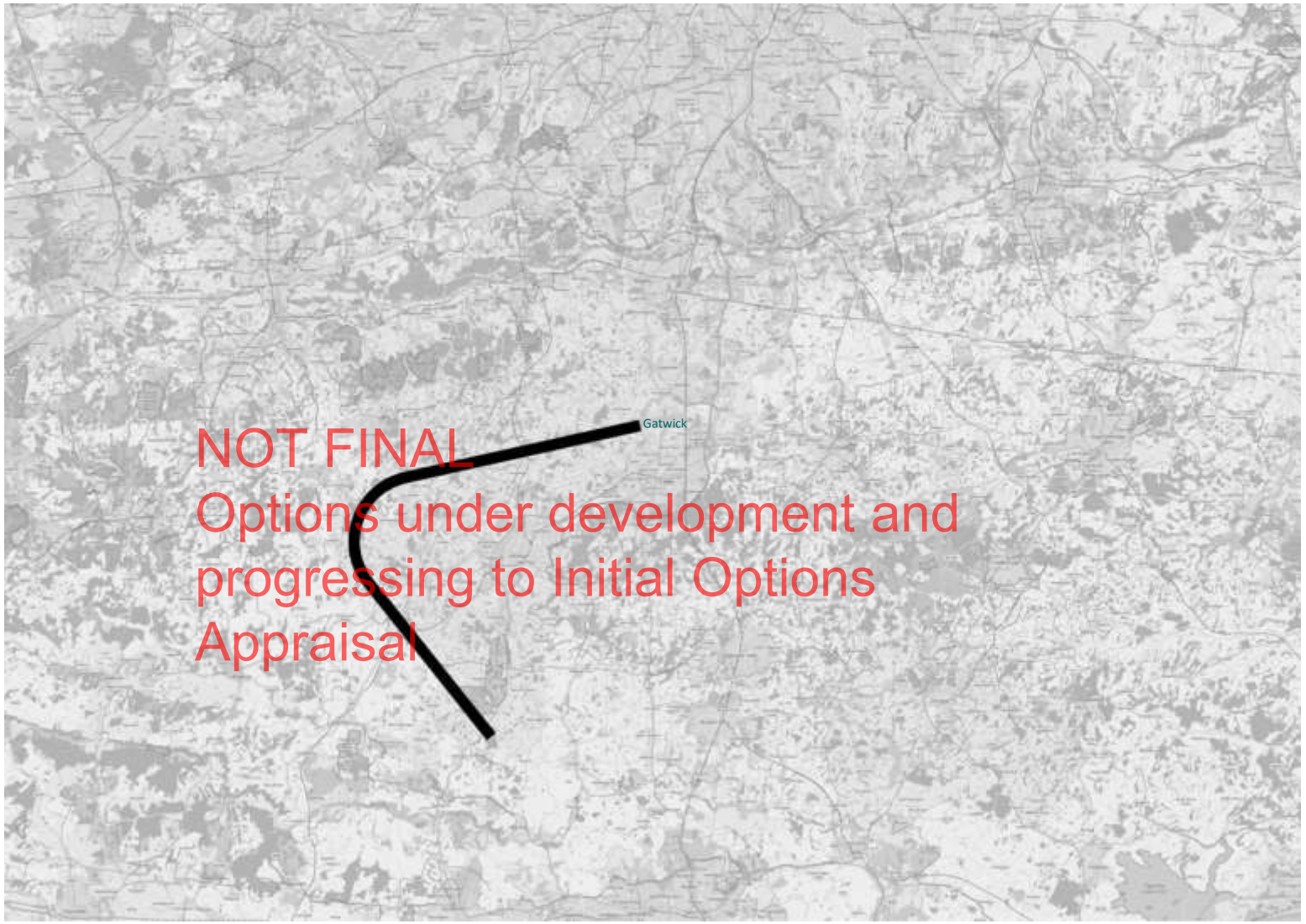
Arrivals
EAN

Note: To be operated alongside an RMA



7000-0 (3º descent)

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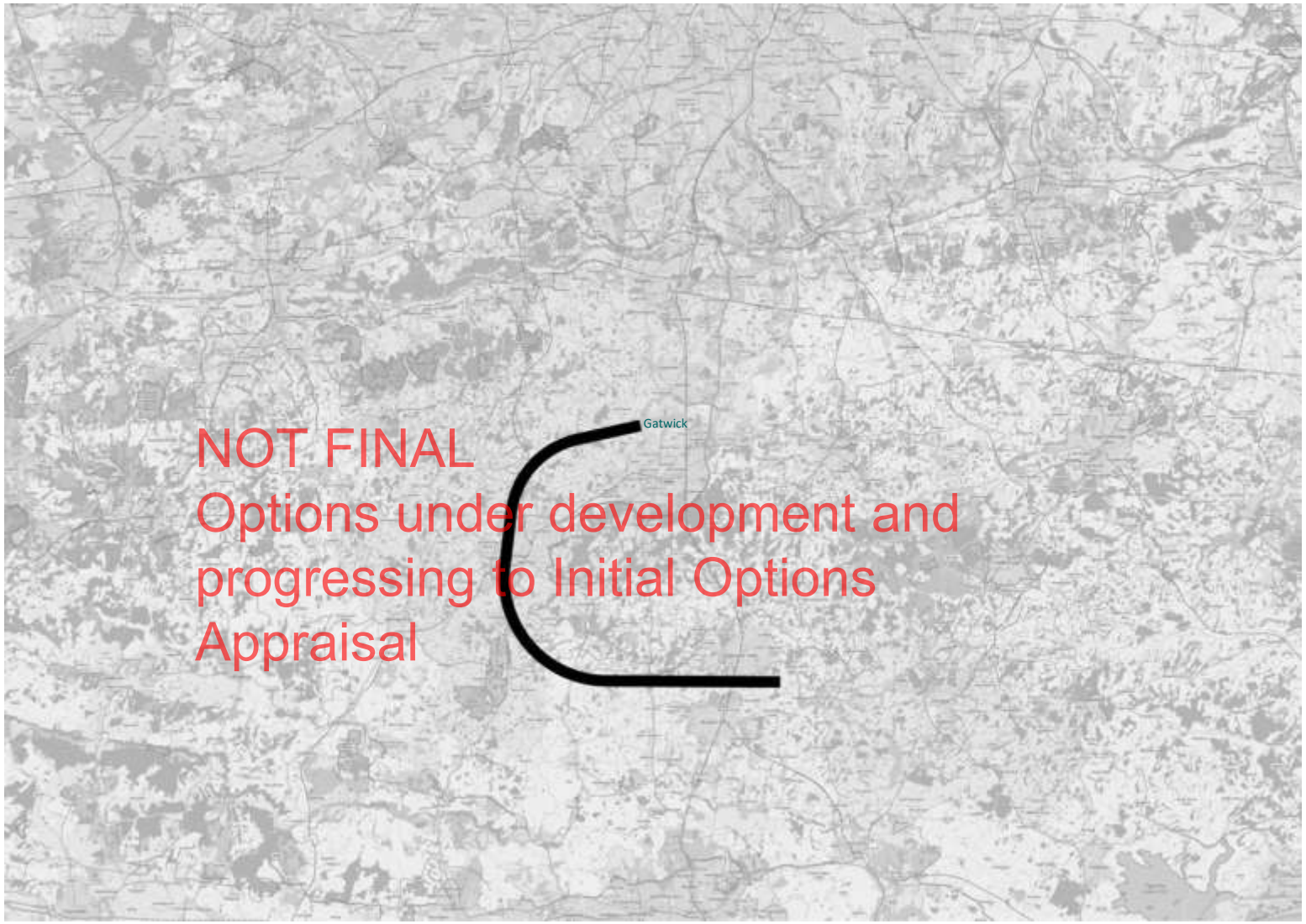
Arrivals
EAO

Note: To be operated alongside an RMA

RNP-AR route



7000-0 (3º descent)

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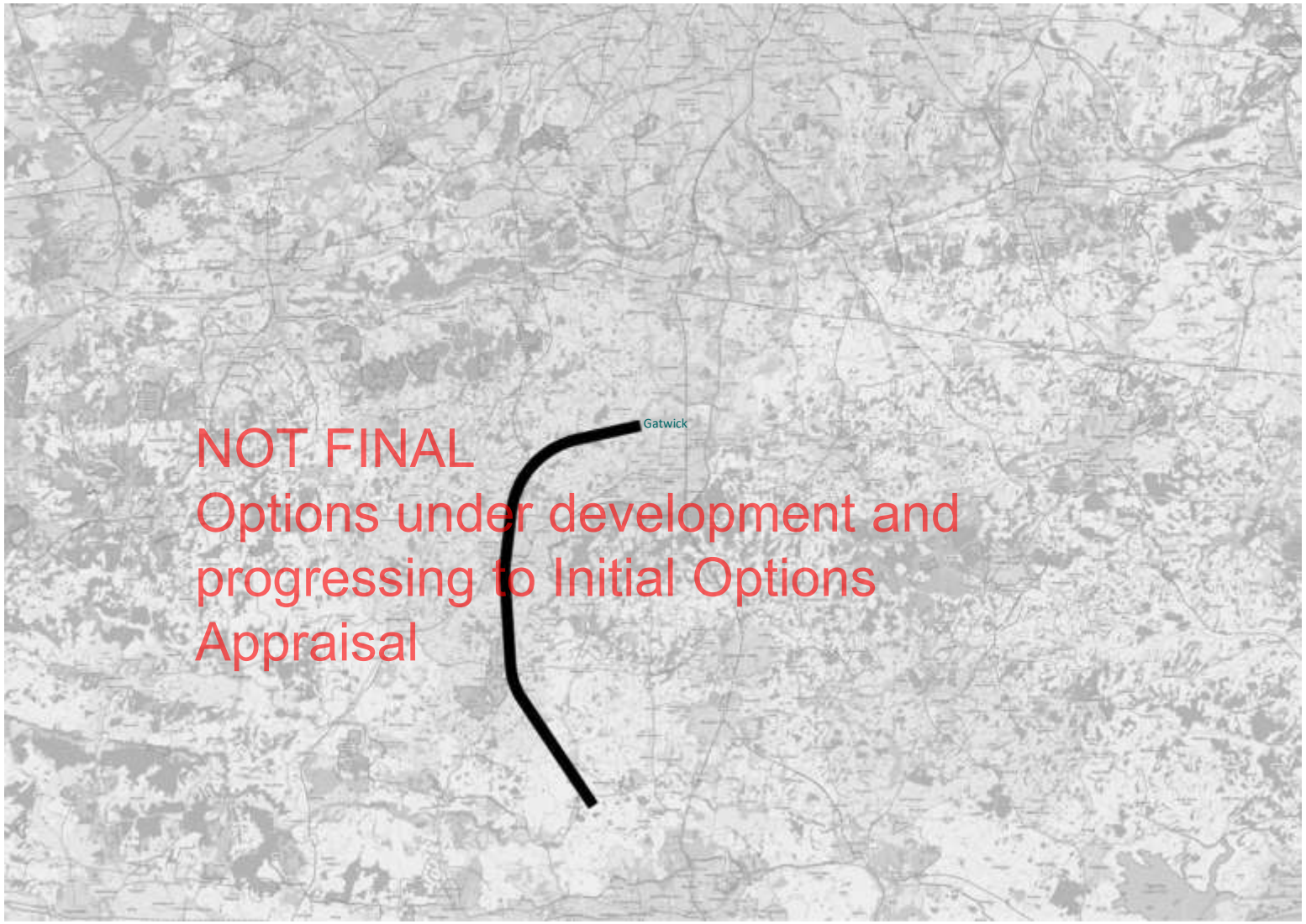
Arrivals
EAP

Note: To be operated alongside an RMA

RNP-AR route



7000-0 (3º descent)

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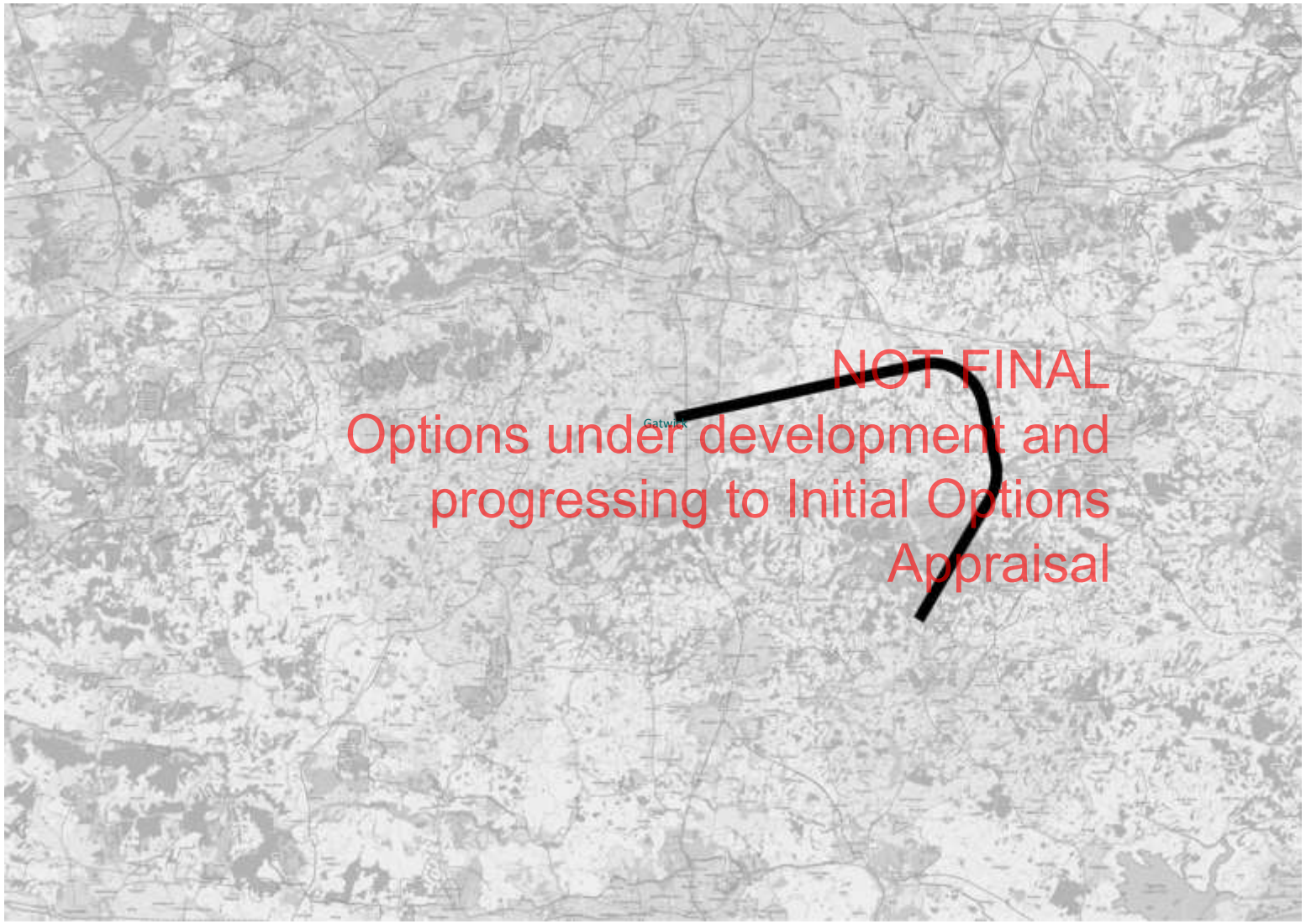
Arrivals
WAA

Note: To be operated alongside an RMA



7000-0 (3º descent)

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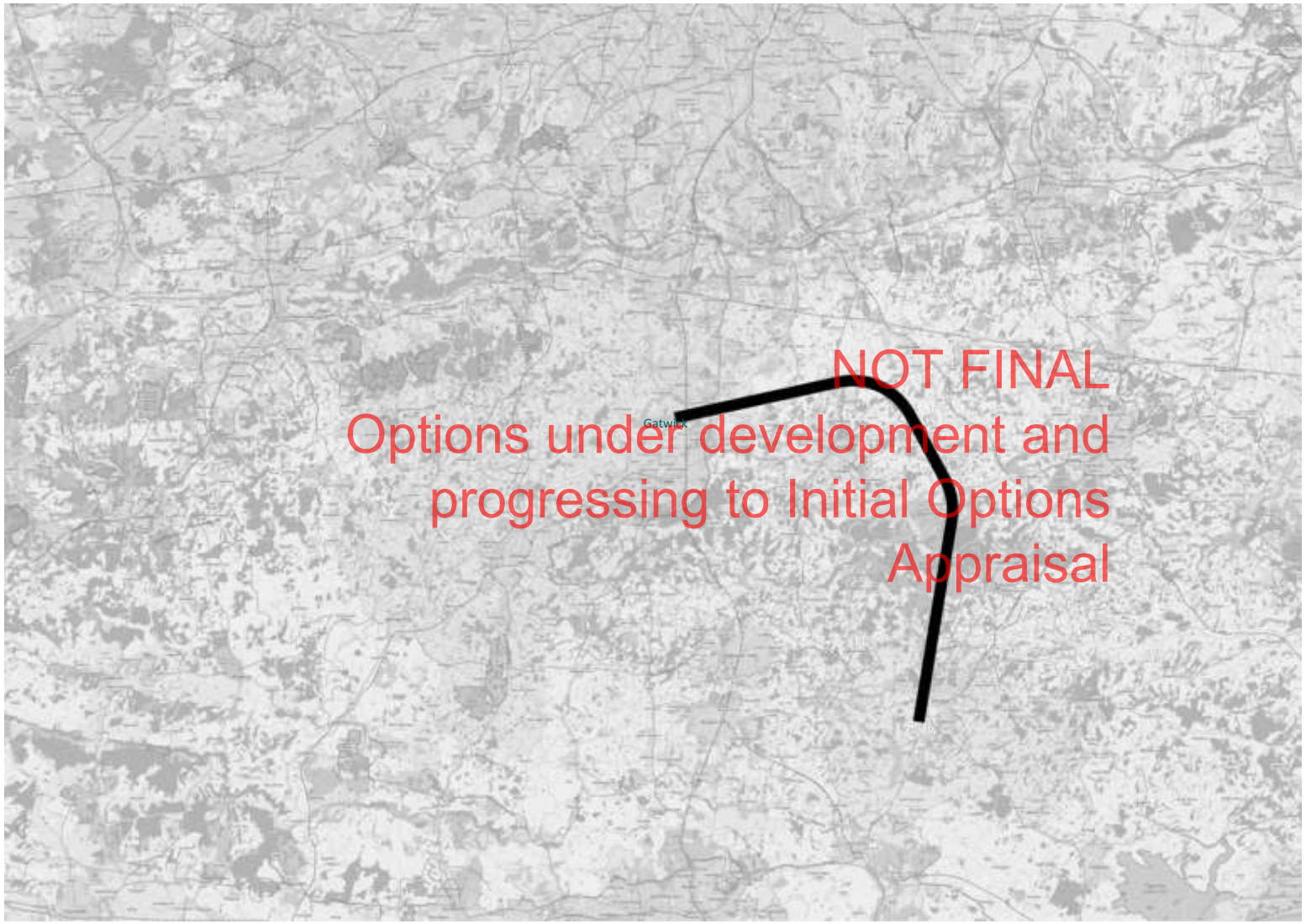
Arrivals WAC

Note: To be operated alongside an RMA



7000-0 (3^{o} descent)

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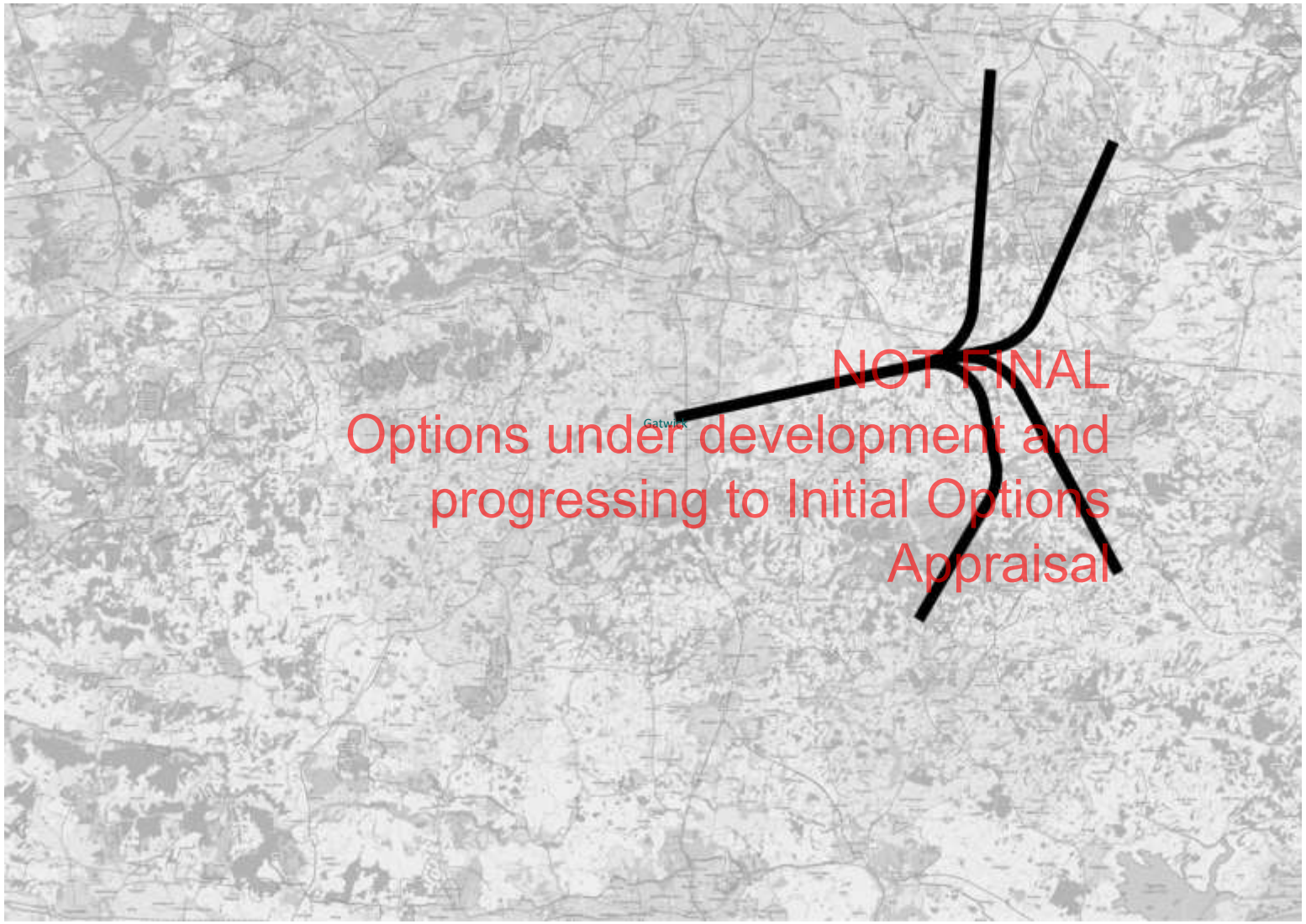
Arrivals
WAD

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)

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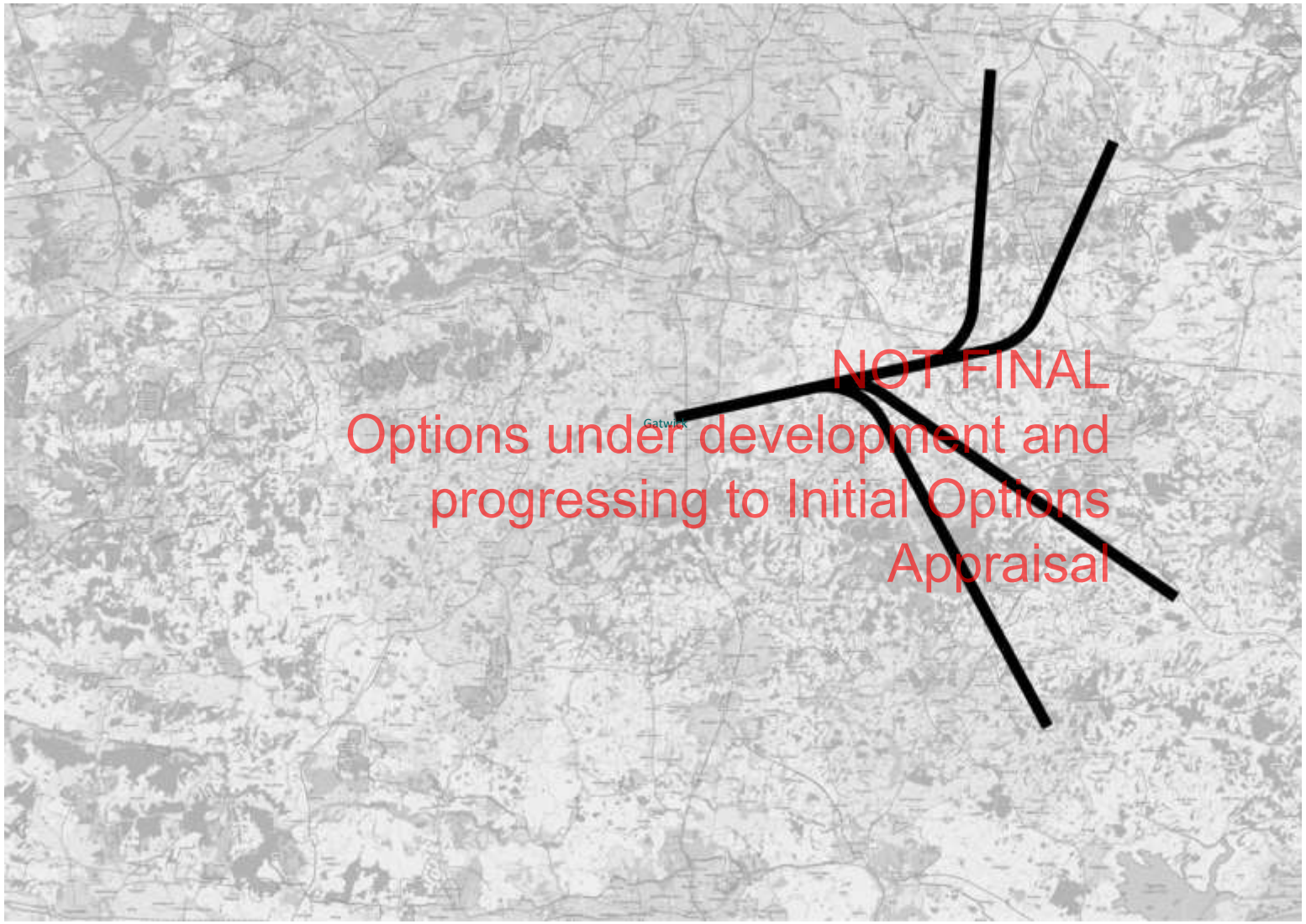
Arrivals
WAE

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)

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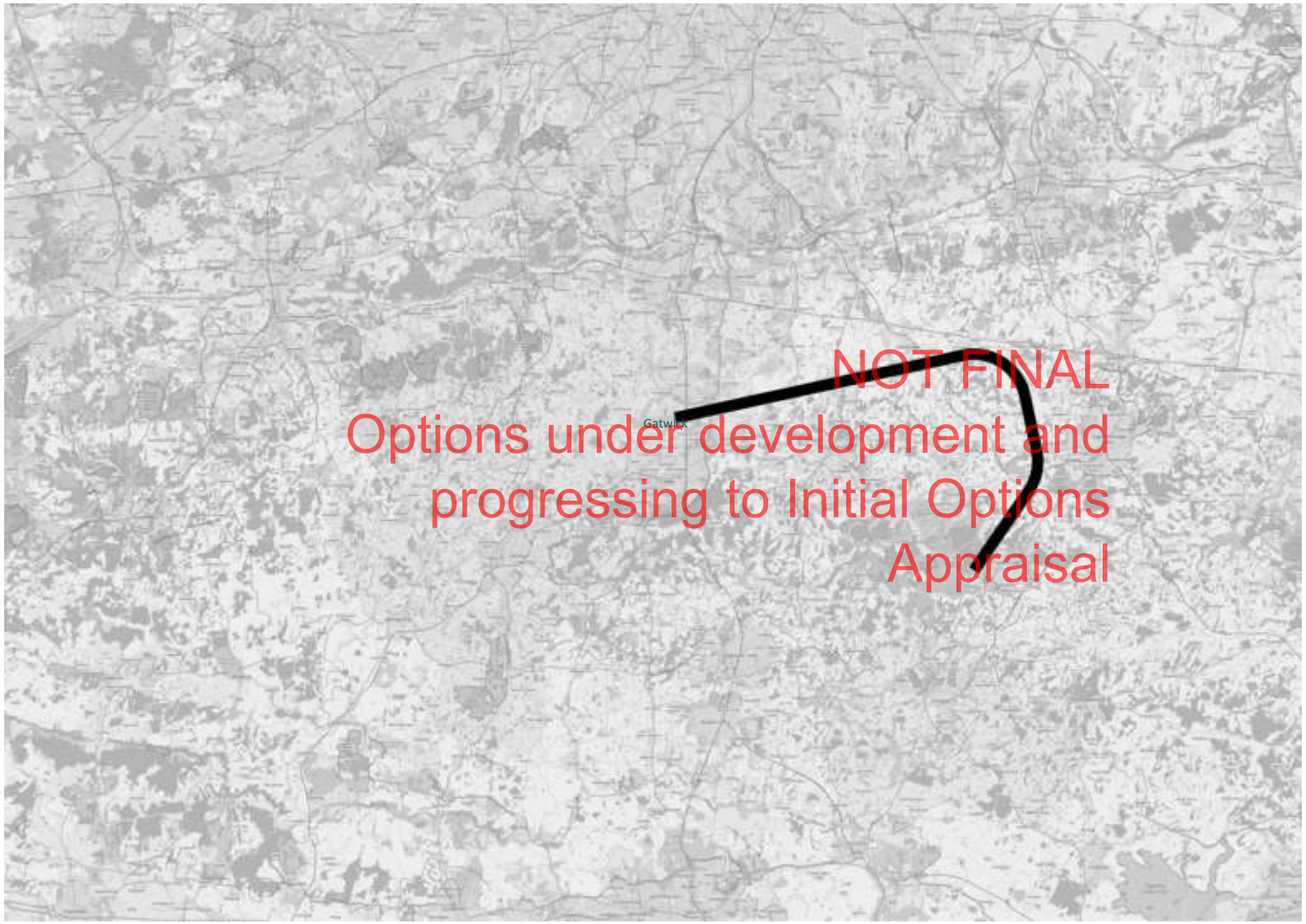
Arrivals
WAF

Note: To be operated alongside an RMA



7000-0 (3º descent)

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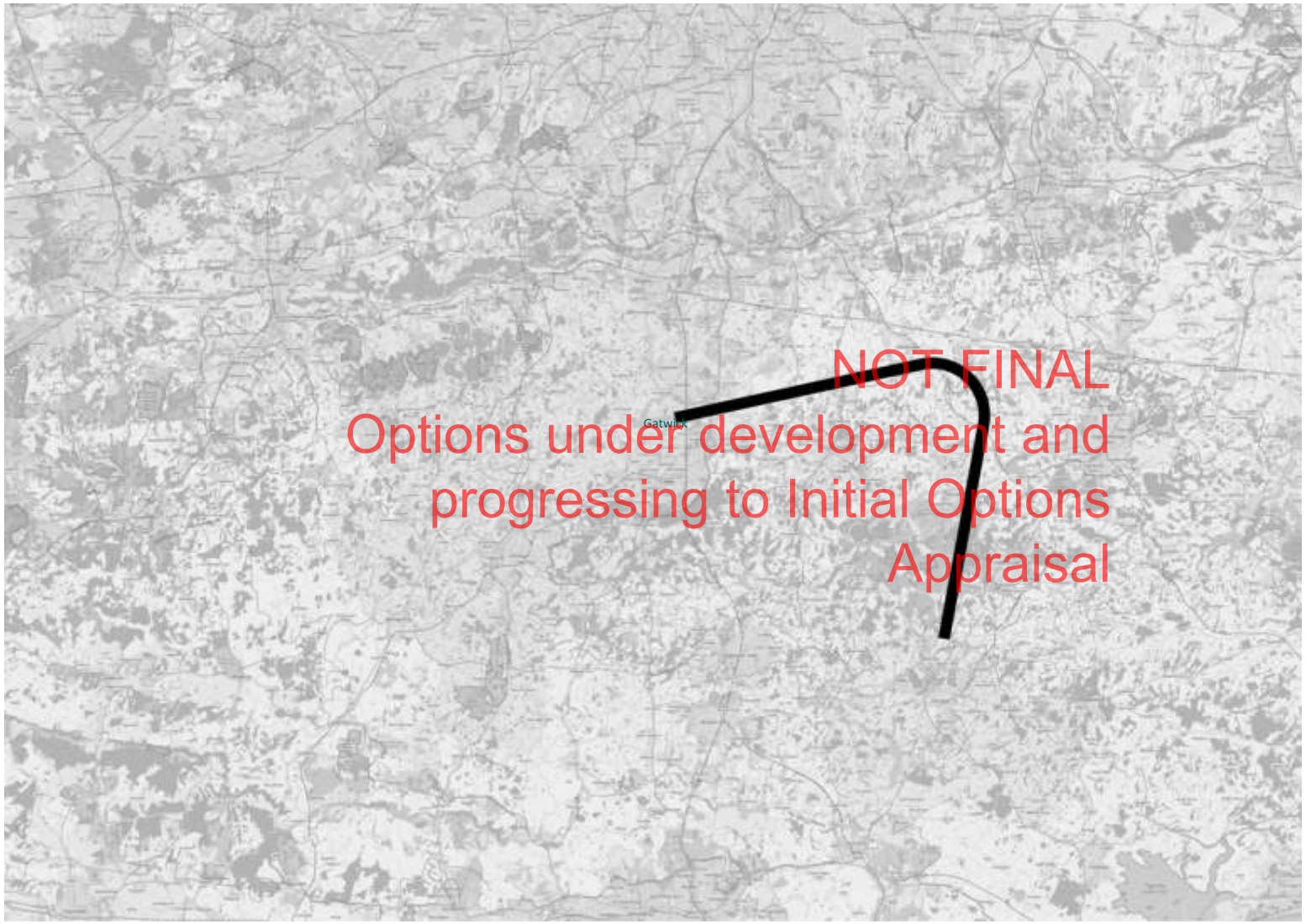
Arrivals
WAH

Note: To be operated alongside an RMA



7000-0 (3º descent)

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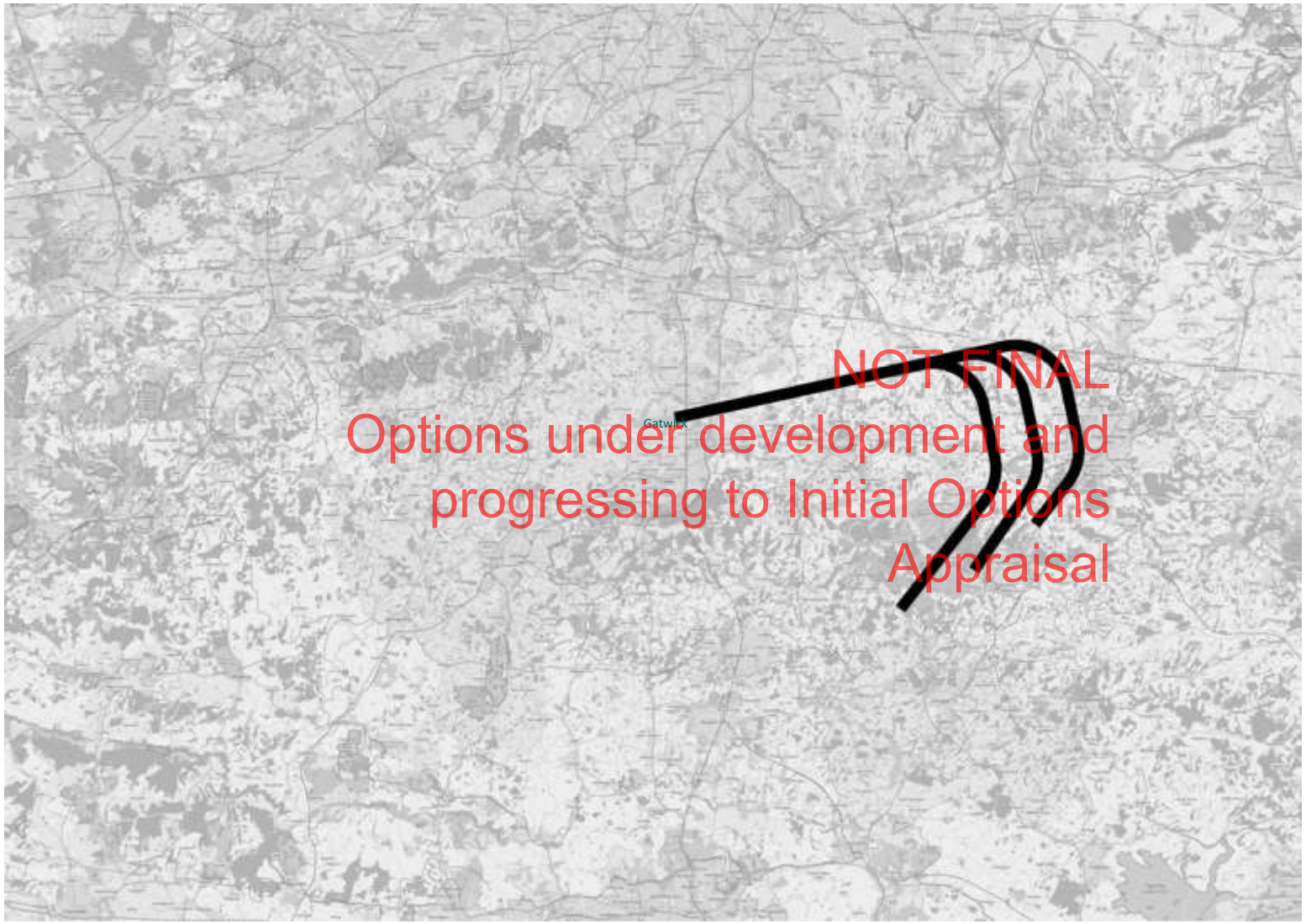
Arrivals
WAI

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally



7000-0 (3º descent)

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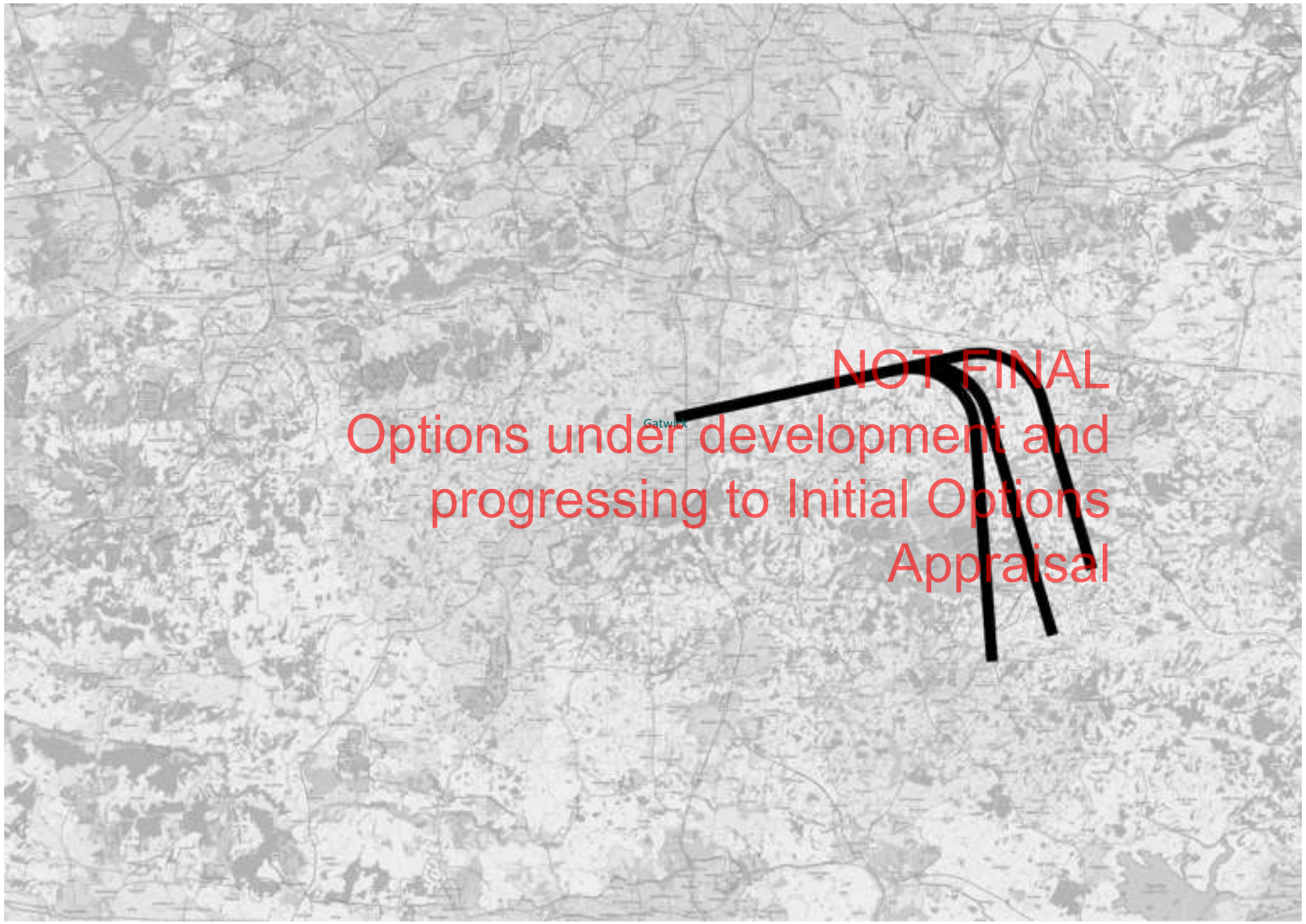
Arrivals
WAJ

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally



7000-0 (3º descent)

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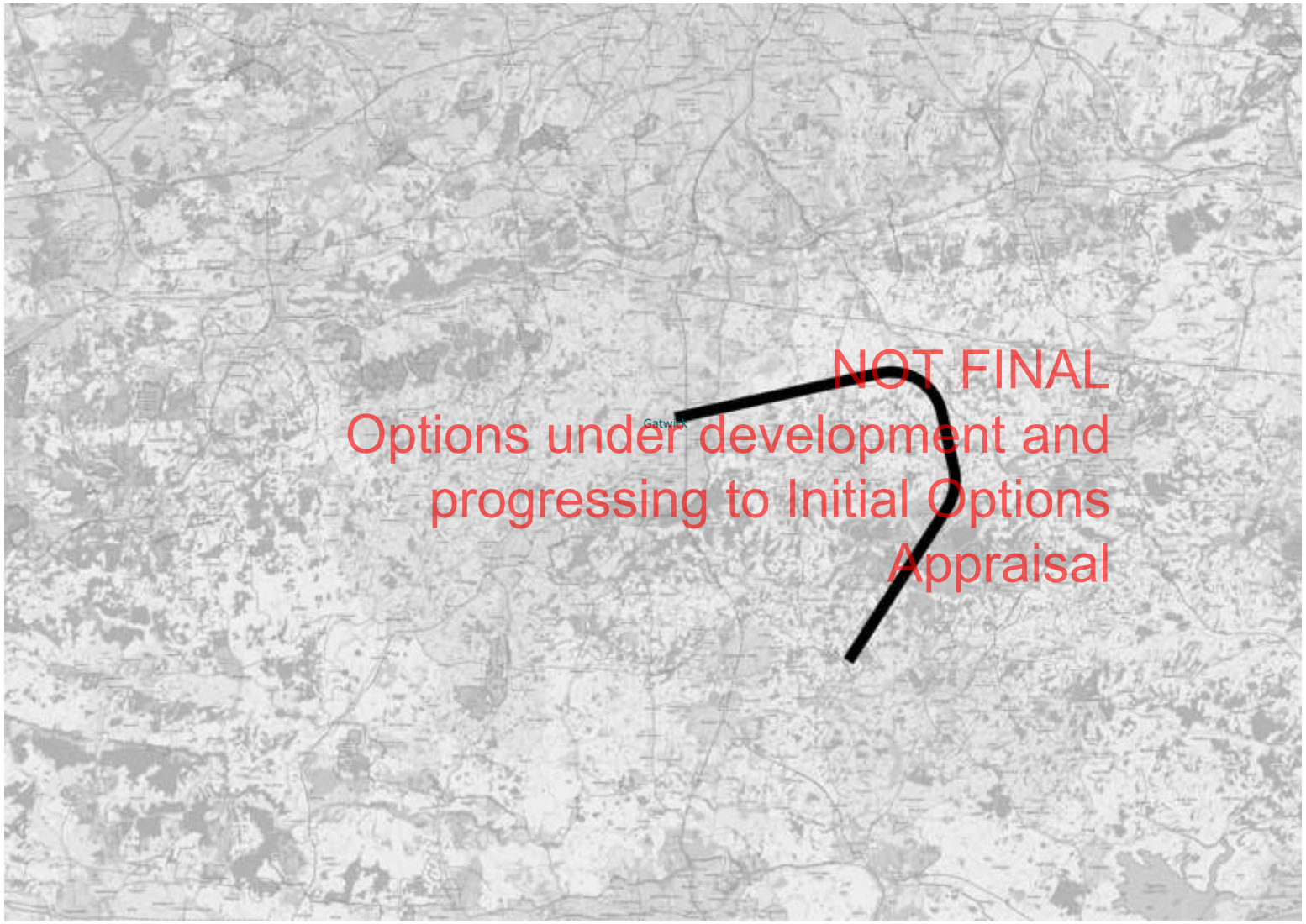
Arrivals
WAK

Note: To be operated alongside an RMA



7000-0 (3º descent)

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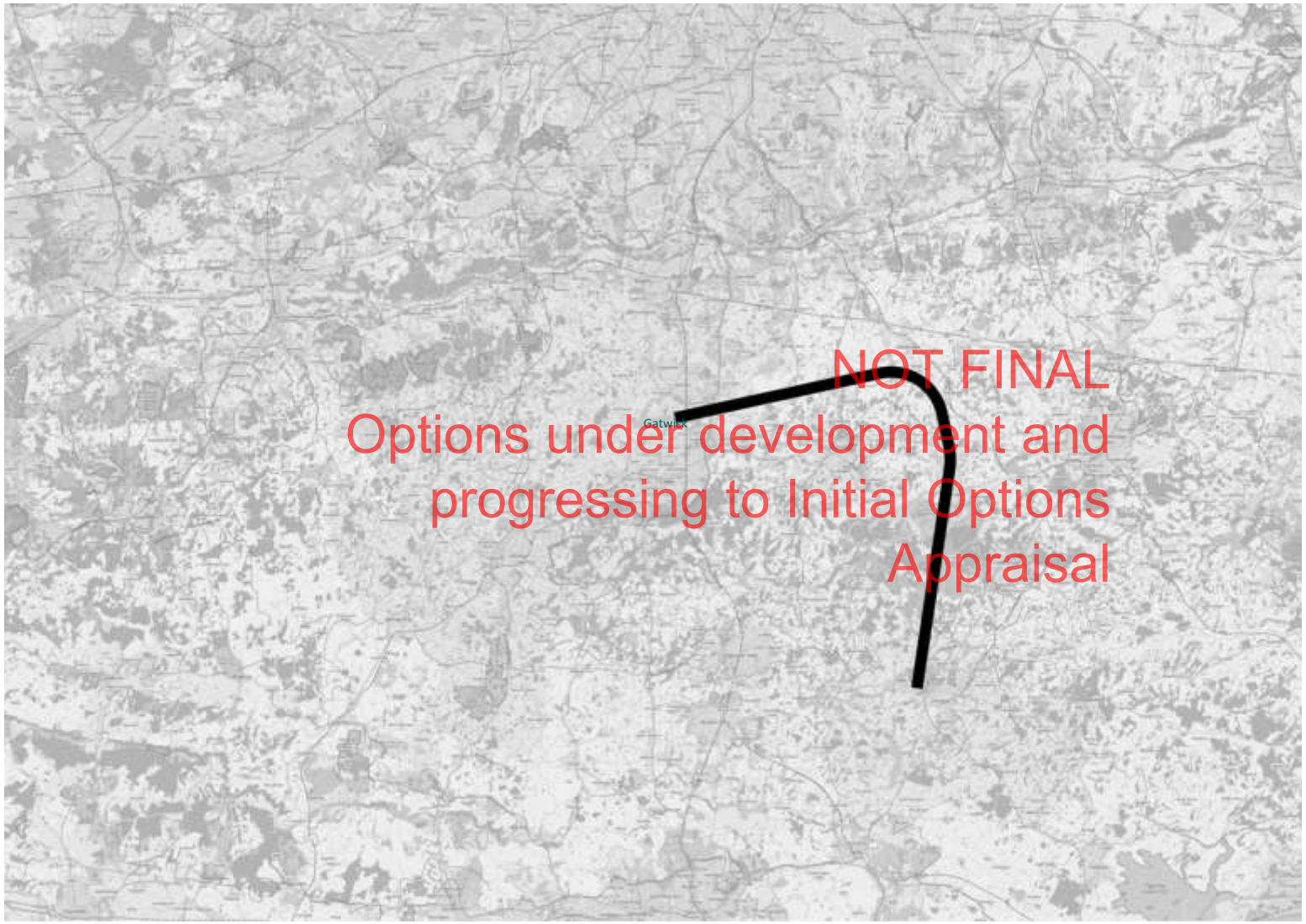
Arrivals
WAL

Note: To be operated alongside an RMA



7000-0 (3^{o} descent)

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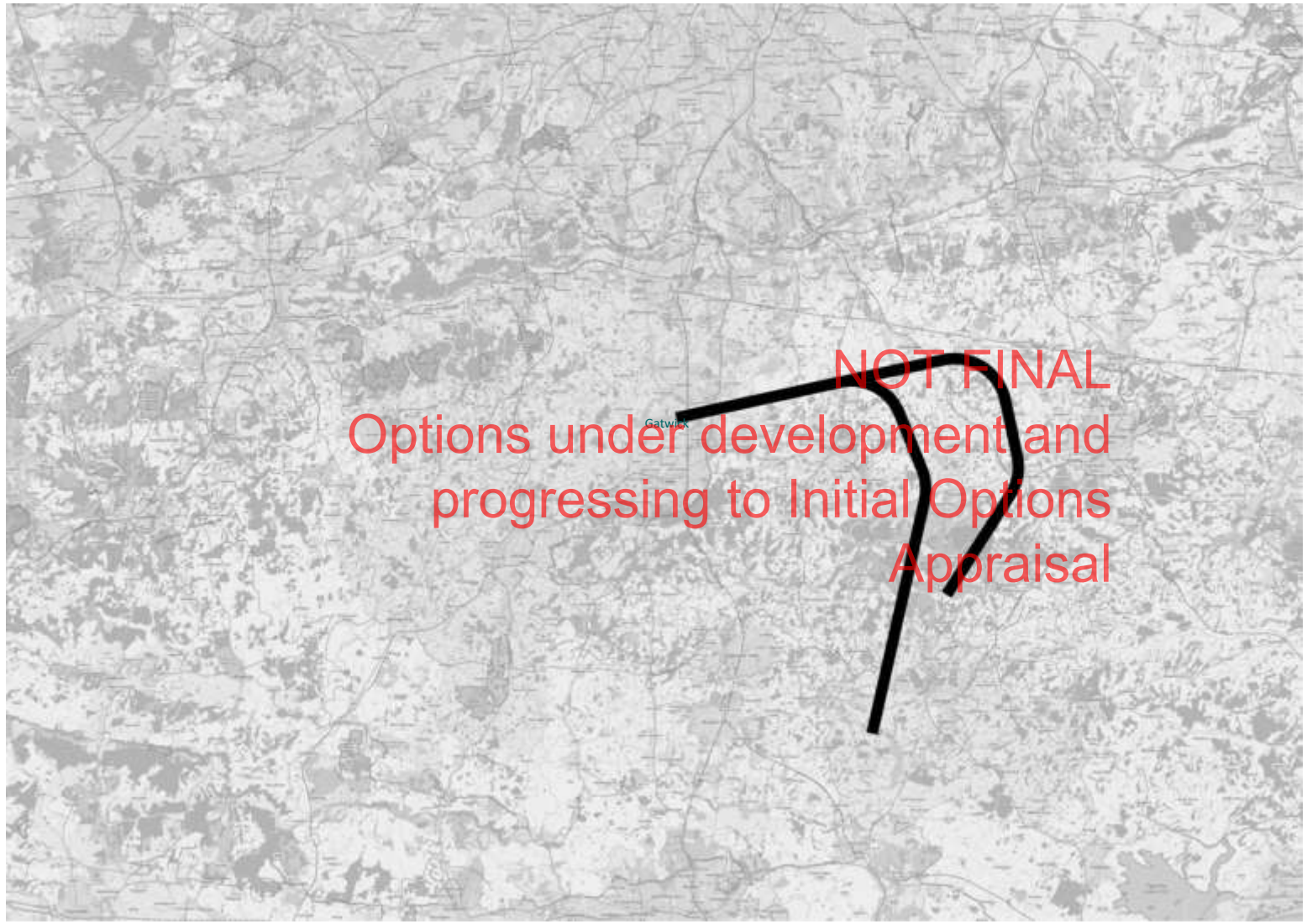
Arrivals
WAM

Note: To be operated alongside an RMA

For the purposes of the IOA, route use split equally



7000-0 (3º descent)

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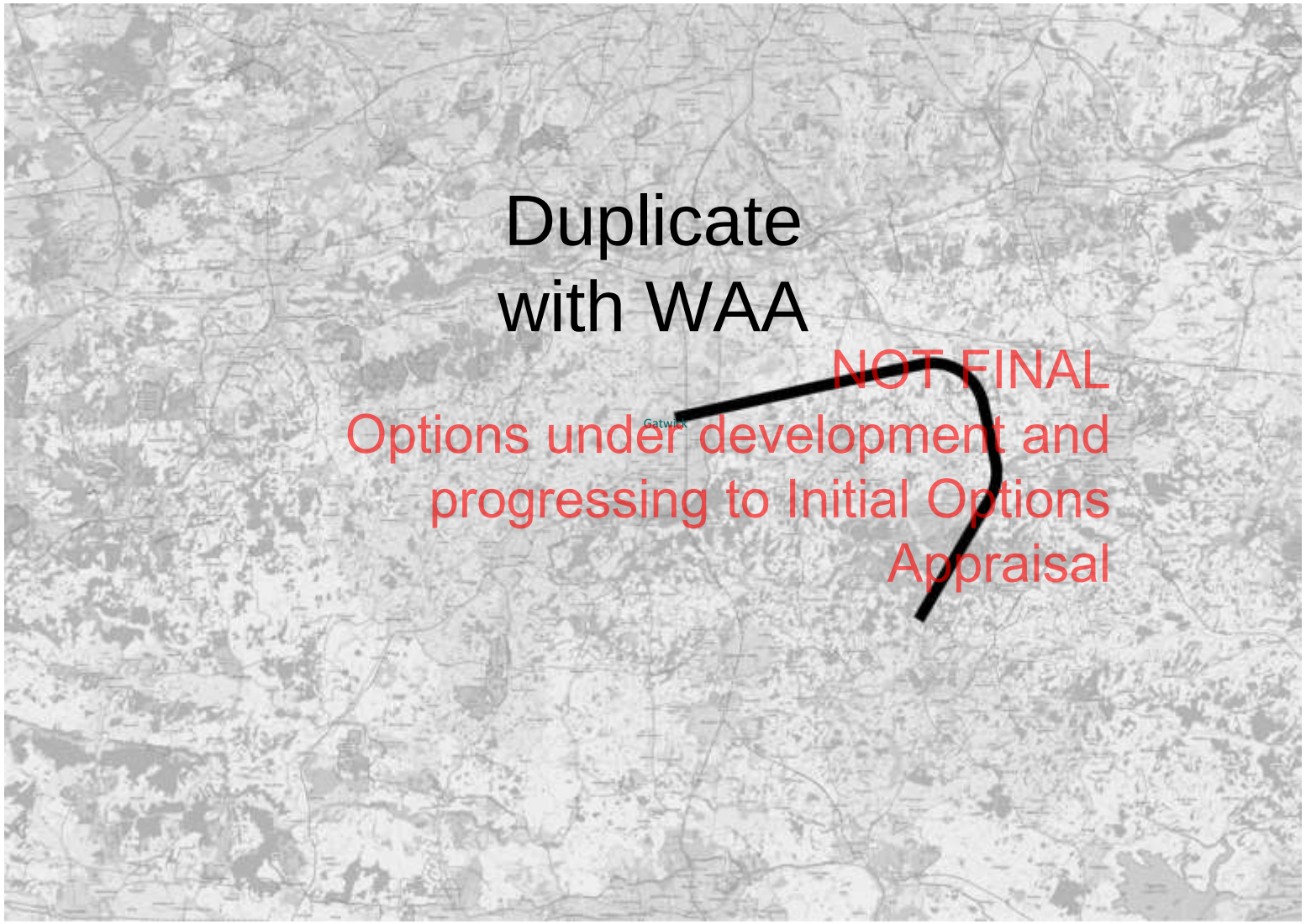
Arrivals
WAN

Note: To be operated alongside an RMA



7000-0 (3º descent)

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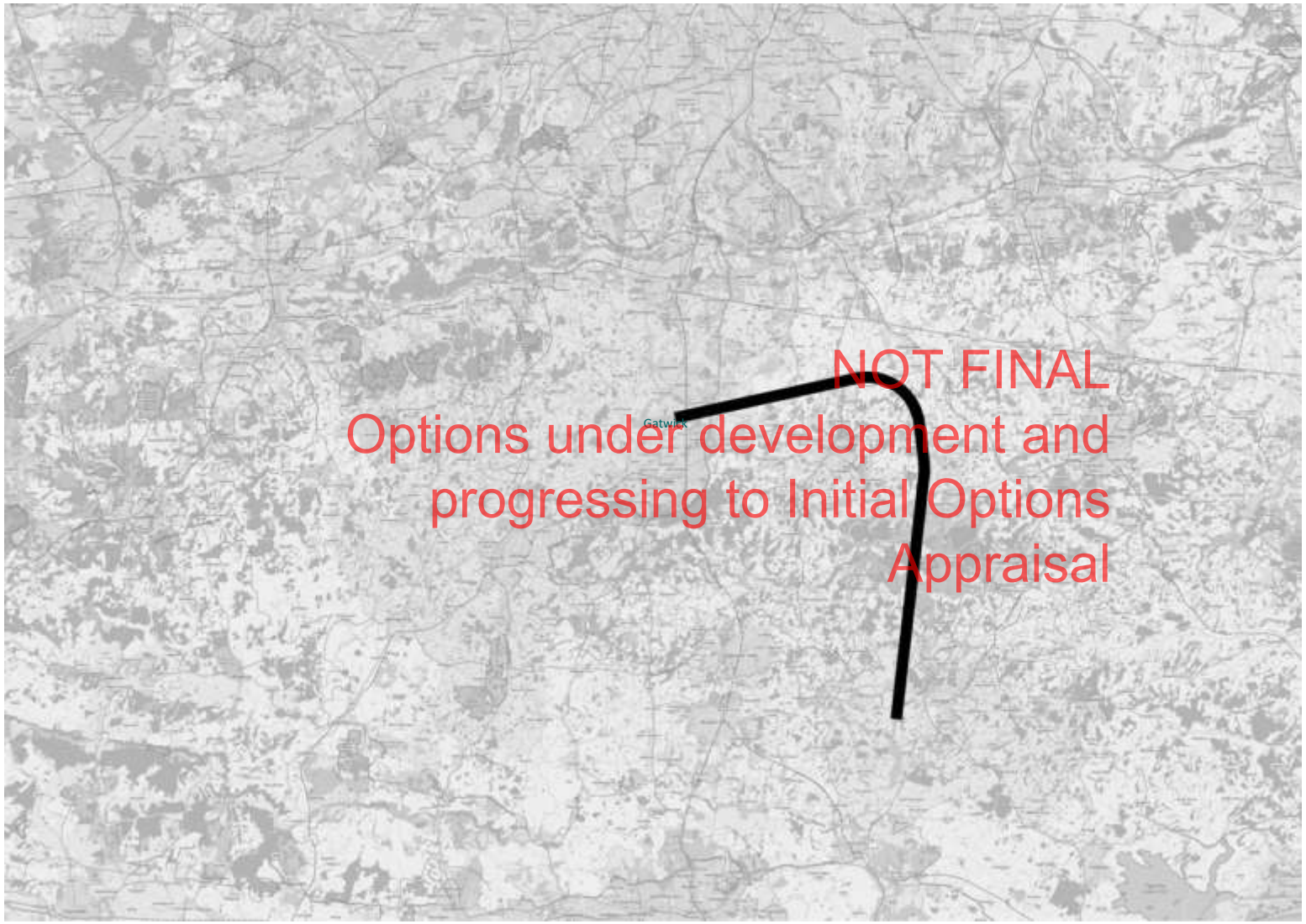
Arrivals
WAO

Note: To be operated alongside an RMA



7000-0 (3º descent)

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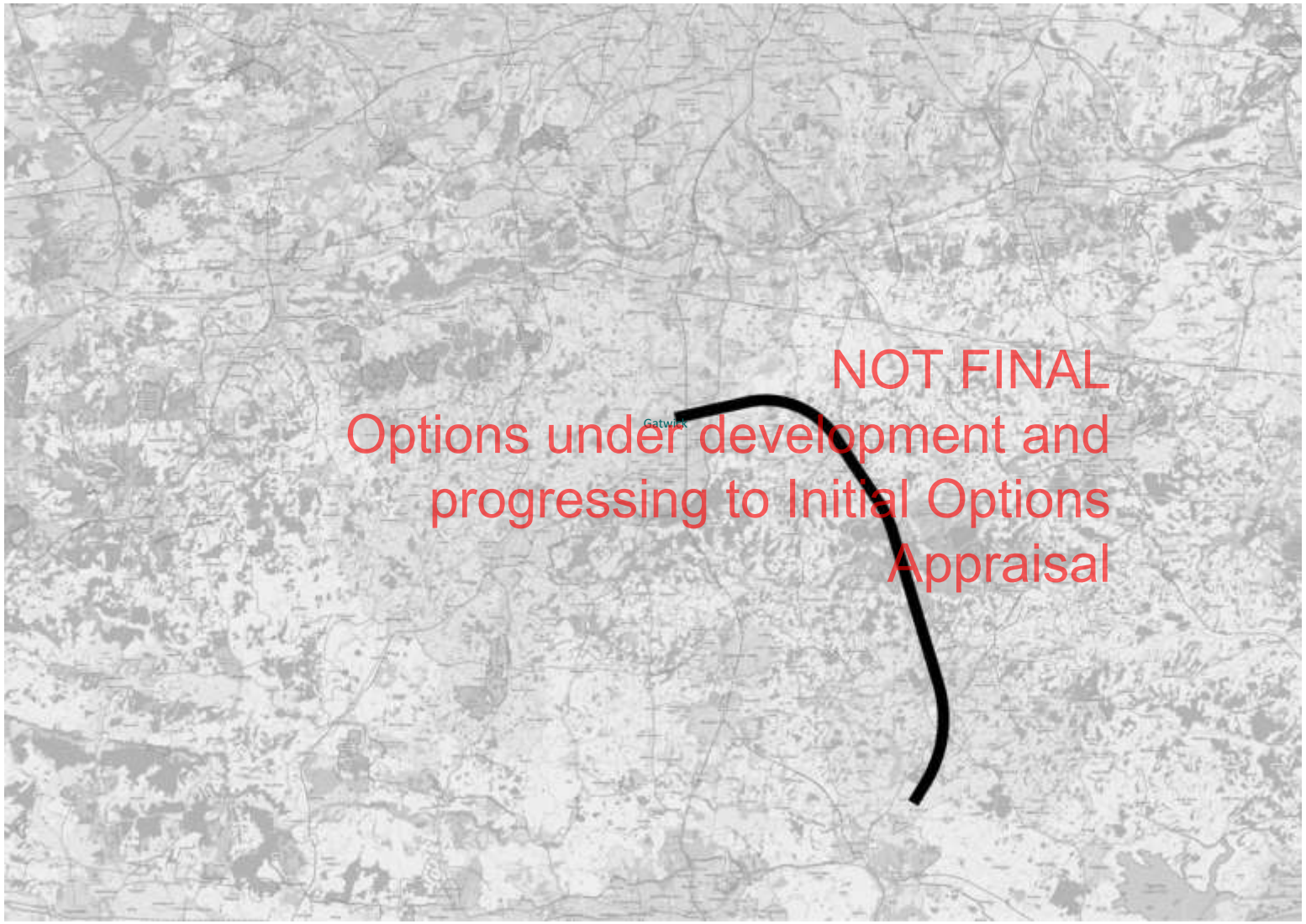
Arrivals
WAP

Note: To be operated alongside an RMA

RNP-AR route



7000-0 (3º descent)

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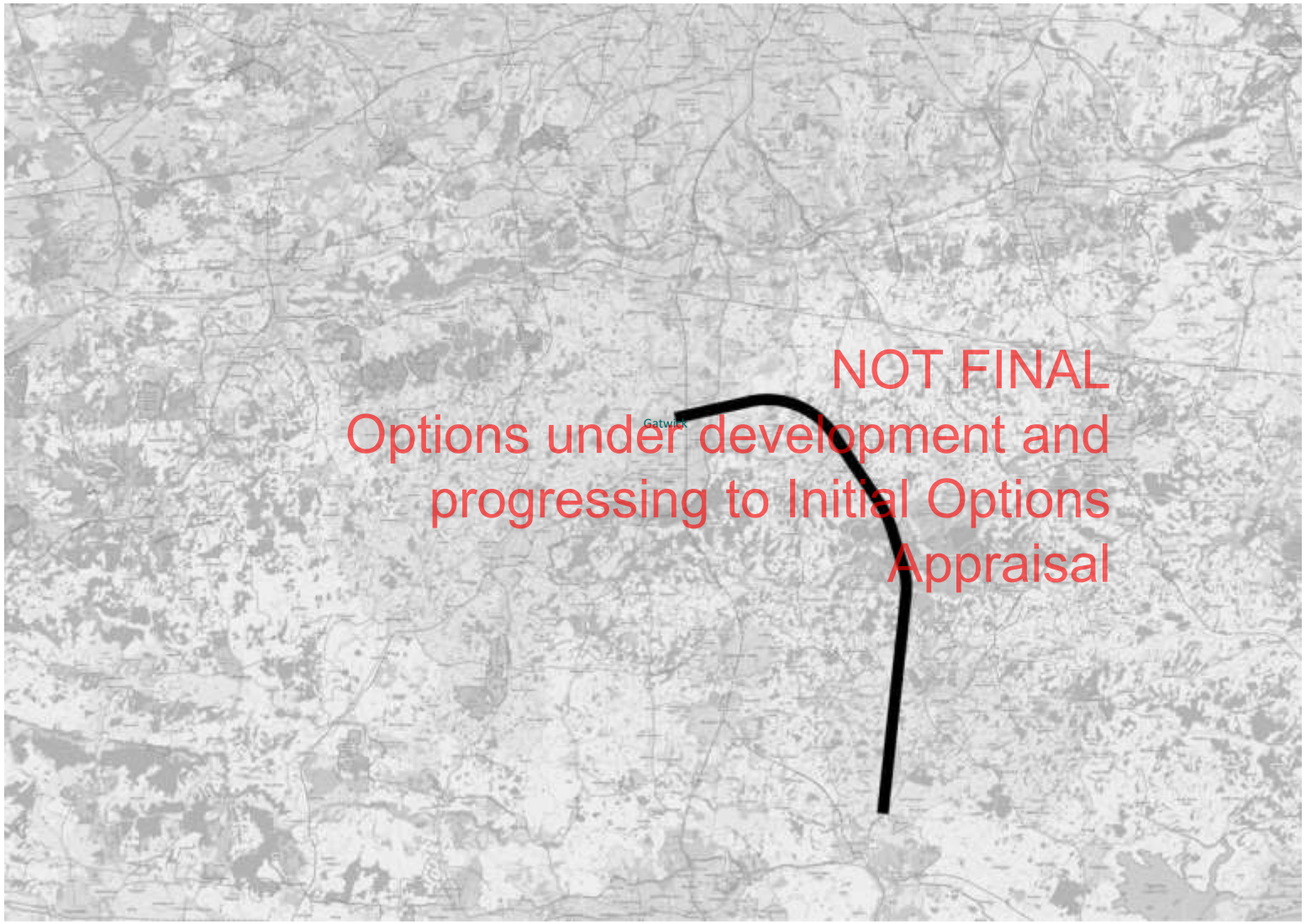
Arrivals
WAQ

Note: To be operated alongside an RMA

RNP-AR route



7000-0 (3º descent)

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