YOUR LONDON AIRPORT Gatwick

Gatwick Route 4 Redesign of RNAV SIDs

Options Development Step 2A

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1 Options Development

1.1 Background

London Gatwick Airport began the process of re-designing the Route 4 Standard Instrument Departure (SID) in late January 2019.

The airport fully embraces the spirit of the CAA CAP 1616 process that seeks to ensure a continued level of engagement and transparency throughout the airspace change process. At key stages, Gatwick Airport will share its progress with its stakeholders and seek continued feedback in support of the Route 4 change.

1.2 Purpose of This Document

This document provides a graphical representation of each option that comprises the viable Comprehensive List of design options.

A precis of the design methodology and rationale is provided in Section 2.

The options were informed by the shortlisted Design Principles, these are shown in Section 3.

A list of the unsupported options can be found in the Design Principles Evaluation document on the CAA Airspace Change Portal.

There are eight options in total each of which are shown against an Ordnance Survey 1:50,000 background Map in Section 4. The nominal tracks are shown along with a representation of the existing area in which aircraft would be expected to fly the route given the proposed Path Terminator ARINC 424[1] coding used for each option.

Option 7 was added late in the engagement process. It will be necessary to undertake a more accurate design development which will be completed ahead of the public consultation. This will more clearly define the areas impacted by the concentration of tracks.

[1] Path Terminator ARINC 424 - ARINC 424 is a worldwide Standard for the navigation system database used by aircraft flight management systems to fly between waypoints in the proximity of airports.

2 Option Design Methodology

2.1 Option 0

This is the currently flown LAM 2X Standard Instrument Departure (SID) as published in the State AIP. Following an initial fly-over waypoint (not below 1500ft max 220 KIAS) aircraft fly the turn using a Course to Fix Path Terminator that results in a degree of dispersion during the turn. For airspace, WP KKE09 is flown not below 3200ft and KKE11 not above 4000ft. The speed restriction of 220 KIAS is raised to 250 KIAS at WP KKE 11. Aircraft adjust track at KKE15 by 3° before routing to SUNAV at 5000ft.

2.2 Option 1

This was the previously published LAM 1X SID and was previously published in the State AIP. Aircraft fly straight ahead and make the first turn at KKW04 not below 2500ft. Two 90° turns at the fly-by waypoints KKW04 and KKN06 result in aircraft tracking 079° (True) following the turn. The turn is coded Track to Fix which results in a relatively small degree of dispersion in the turn. Aircraft must be below 4000ft at waypoint KKE14 where the speed restriction of 220 KIAS is raised to 250 KIAS. Aircraft remain on track 079° (True) to SUNAV at 5000ft.

2.3 Option 2

This option uses the same turn as described in Option 0, however, the track adjustment at KKE15 is removed and waypoint NEW 11 is placed on the course that aircraft would nominally roll out of the turn. Waypoint NEW09 maintains the requirement for aircraft to be above 3200ft at a point abeam the original KKE09 and NEW 11 maintains the restriction of aircraft not climbing 4000ft at the point abeam KKE11. NEW11 lifts the speed restriction from 220 KIAS to 250 KIAS.

2.4 Option 3

Aircraft fly straight ahead to KKXX01 and turn not below 1100ft. KKXX02 is the second of two 90°turns with a speed limit of 200 KIAS. Three waypoints are placed abeam each other at a distance of 278m with the intention of providing a degree of apparent dispersion. KKE 09 A, B and C provide different termination points for the paths following the turn although all are coded Course to Fix. This results in three courses being flown to different waypoints and these discreet paths are maintained to three waypoints KKE11 A, B C where the speed restriction of 220 KIAS is lifted to 250 KIAS and the three paths are coded Course to Fix to SUNAV at 5000 ft resulting in a gradual narrowing of the apparent dispersion.

2.5 Option 4

Option 4 utilises three initial turning points placed sequentially 400m apart. These waypoints are coded to ensure aircraft do not turn below 1500ft with the intention that there will be apparent dispersion in the turn. The turn is designed to be flown with Course to Fix Path Terminators.

Following the turn waypoint NEW09 maintains the requirement for aircraft to be above 3200ft at a point abeam the original KKE09 and NEW 11 maintains the restriction of aircraft not climbing 4000ft at the point abeam KKE11. NEW11 lifts the speed restriction from 220 KIAS to 250 KIAS.

2.6 Option 5

Option 5 uses the same methodology as option 1 which incorporates two 90° turns at fly-by waypoints followed by a direct track to SUNAV at 5000ft. The speed is reduced in the turn to 200 KIAS and this results in the waypoints being placed closer together, as a result the turn is completed to the south of that designed in Option 1. The 200 KIAS restriction is lifted to 250 KIAS at NEW12.

2.7 Option 6

This option is an amalgam of Options 3 and 4 and is expected to result in apparent dispersion in, and following, the turn. Option 6 brings the paths to a common waypoint at KK11A and from there a concentrated track of traffic to SUNAV at 5000ft utilising a Track to Fix PT unlike the Course to Fix used in Option 3 which leads to a more gradual concentrating of the tracks closer to SUNAV.

2.8 Option 7

Following feedback within the engagement process it was decided an option should be presented to the focus group that included concentration of tracks. The method chosen was a Constant Radius to Fix (RF) option.

The graphic presented and reproduced below was intended to demonstrate the degree to which an RF turn would lead to a concentrated track. It was explained that this was an indicative swathe to demonstrate the degree of concentration that could be expected for this type of design. This design will need further work ahead of the public consultation to more accurately depict a track over the ground that will minimise the numbers of people newly overflown. The graphic does not show a fully designed RF turn; this limitation was discussed during the stakeholder engagement events and the graphic does not fully represent the populations that may be overflown.

Summary:

Option	Option Description	Feature
0	Fly-over / Fly-by	Current temporary LAM 2X
1	Fly-by / Fly-by	Two 90° Turns was LAM 1X
2	Fly-over / Fly-by	As LAM 2X but DCT SUNAV
3	Fly-by / Fly-by	Apparent dispersion following second turn
4	Fly-over / Fly-by	Multiple initial turn points
5	Fly-by / Fly-by	As option 1 but lower speed
6	Fly-over / Fly-by	Multiple turn points plus apparent dispersion
7	Constant Radius to Fix	Concentrated

Table 1 – Comprehensive List of viable Design Options

3 Design Principles Short List

3.1 Introduction

This section provides a re-cap of the Design Principle short list.

3.2 Prioritised Shortlist of Design Principles

The shortlisted Design Principles are:

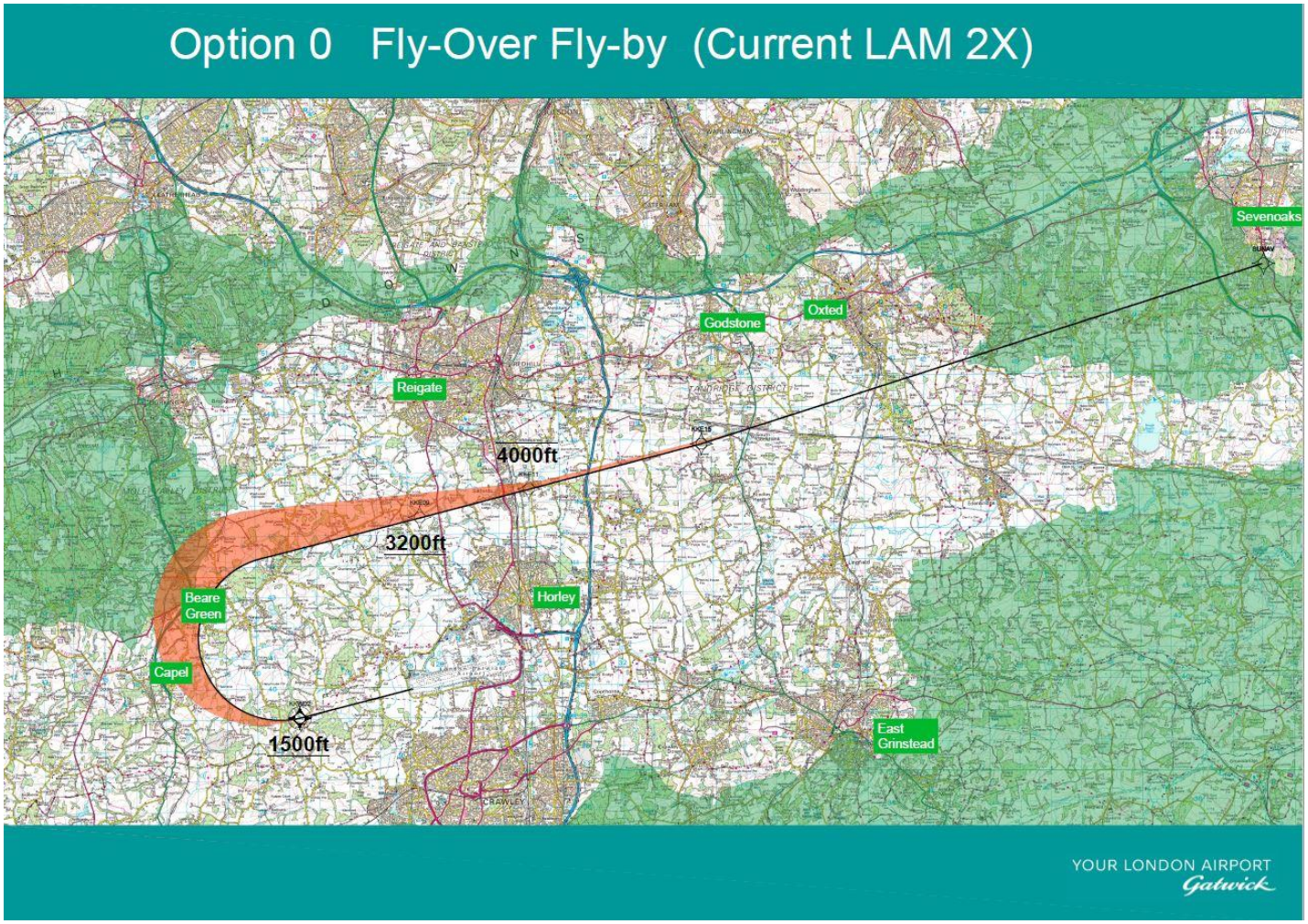
Prioritised No (a)	Original No (b)	Design Principle (c)
8	1	Route 4 options will be designed safely in accordance with all extant regulation
9	2	New Route 4 designs should replicate as close as practicable the conventional departures in use before 2012
10	5	Routes should include an extended westerly climb profile before a later easterly turn
11	7	Procedures should include RF legs
12	9	ARINC 424 coding must ensure aircraft follow the desired lateral and vertical paths
13	10	Route 4 designs should consider neighbouring airports procedures to ensure adequate deconfliction
14	11	Route 4 designs should consider FASI-S designs and ensure appropriate alignment
15	13	Overflight protections already contained in the UK AIP must be maintained
16	14	Designs should be built to manage dispersion below 7,000ft
17	15	Designs should be built to concentrate dispersion below 7,000ft
18	17	Designs should seek to minimize overflight of previously unaffected locations
19	19	Routes should be designed to limit the wrap around turn to no more than 180°
20	20	Route 4 designs should avoid overflight of the Surrey Hills AONB
21	22	Route 4 designs should not be restrained by the existing NPR

Prioritised No (a)	Original No (b)	Design Principle (c)
22	25	Route 4 procedures should follow M25 and A24 corridors where background noise already high
23	28	Designs will seek to minimise overflight of notified noise sensitive areas

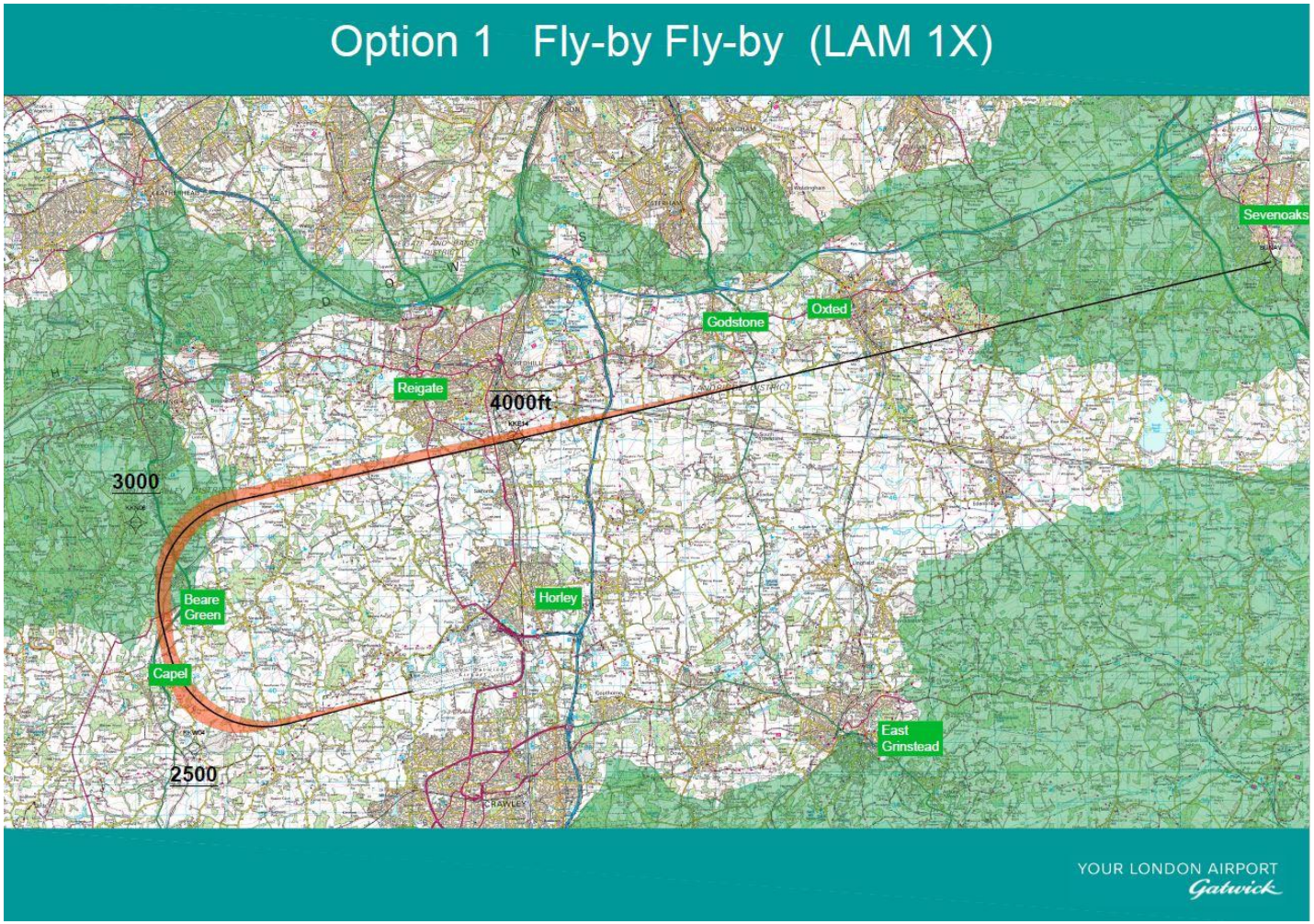
Table 2 - Suggested Prioritised Shortlist of Design Principles

4 Design Options

4.1 Option 0



4.2 Option 1


Option 1 Fly-by Fly-by (LAM 1X)
Sevenoaks
Oxted
Godstone
Reigate
4000ft
3000
Beare Green
Horley
Capel
East Grinstead
2500
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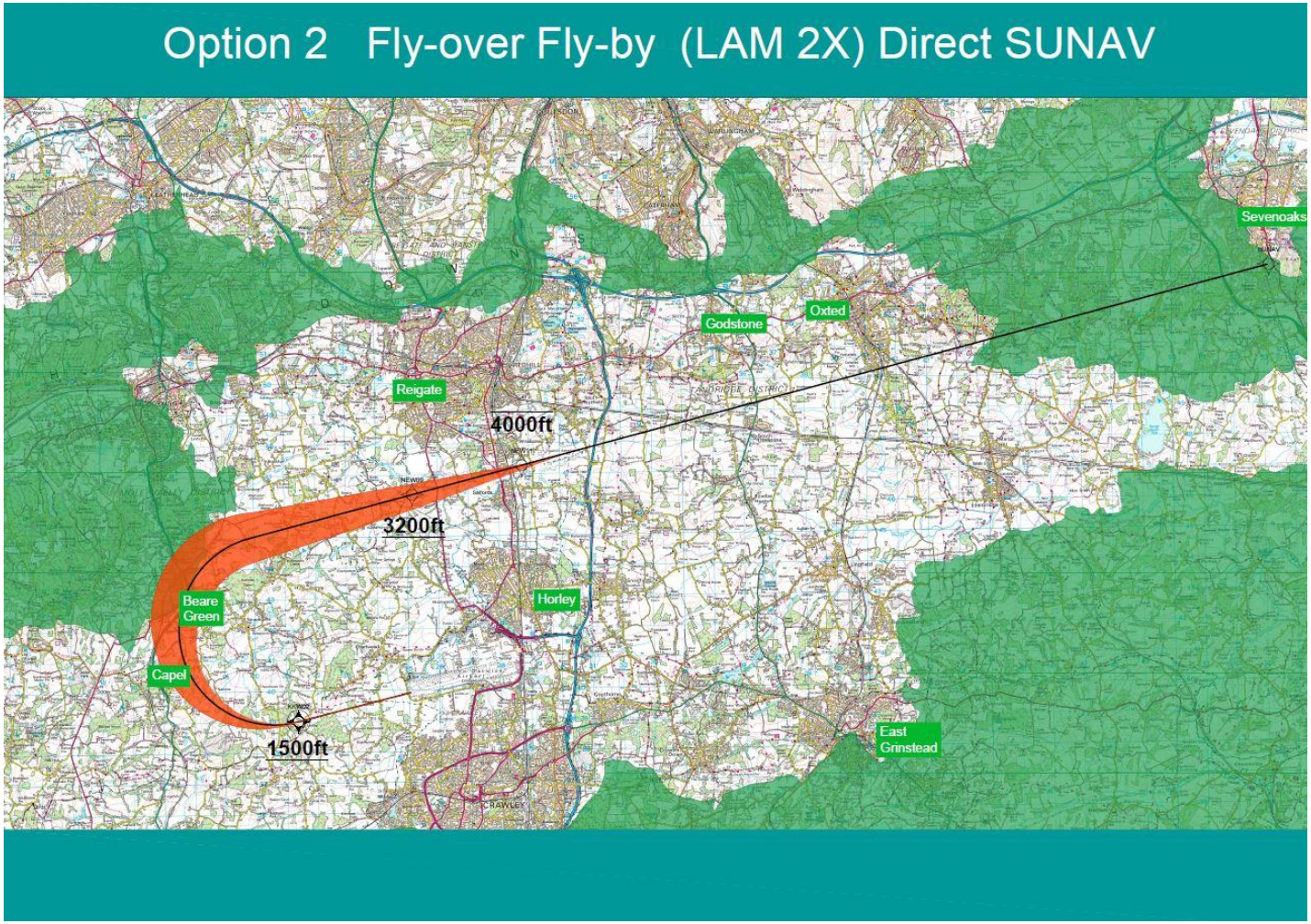
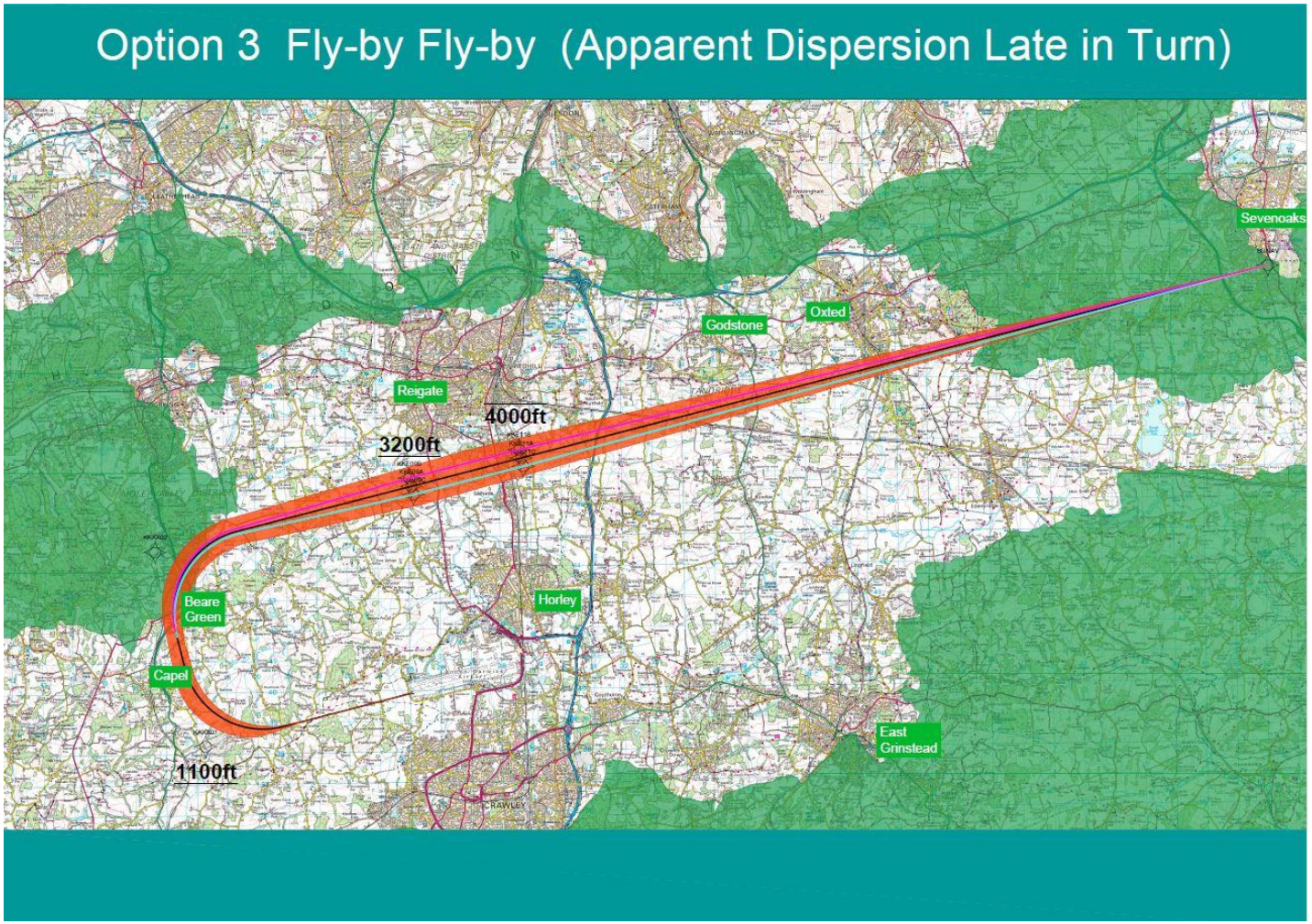
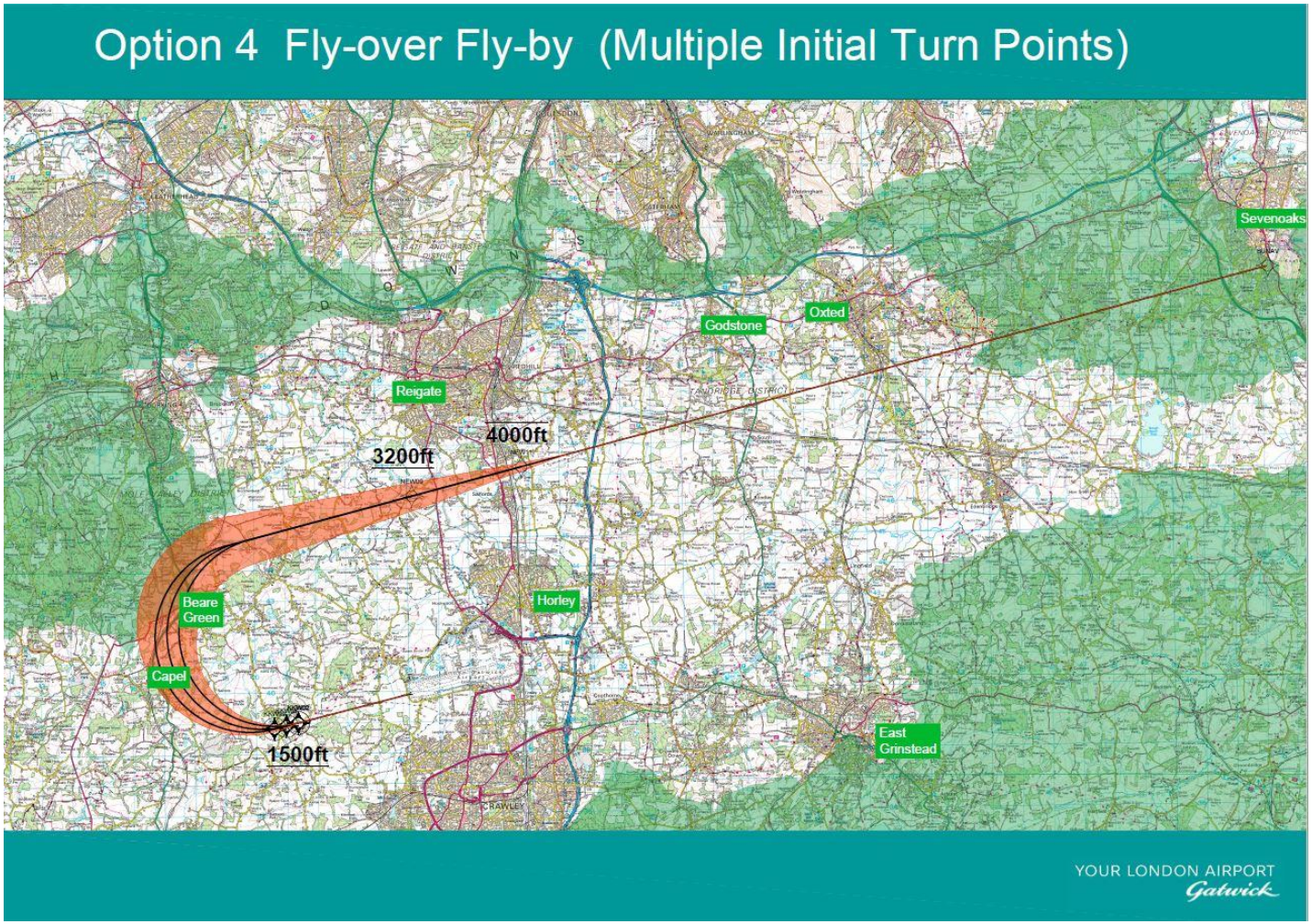
4.3 Option 2


Option 2 Fly-over Fly-by (LAM 2X) Direct SUNAV
Sevenoaks
Oxted
Godstone
Reigate
4000ft
3200ft
Horley
Beare Green
Capel
1500ft
East Grinstead

4.4 Option 3


Option 3 Fly-by Fly-by (Apparent Dispersion Late in Turn)
Sevenoaks
Oxted
Godstone
Reigate
4000ft
3200ft
Beare Green
Horley
Capel
East Grinstead
1100ft
CRAWLEY

4.5 Option 4


Option 4 Fly-over Fly-by (Multiple Initial Turn Points)
Sevenoaks
Oxted
Godstone
Reigate
4000ft
3200ft
Beare Green
Horley
Capel
1500ft
East Grinstead
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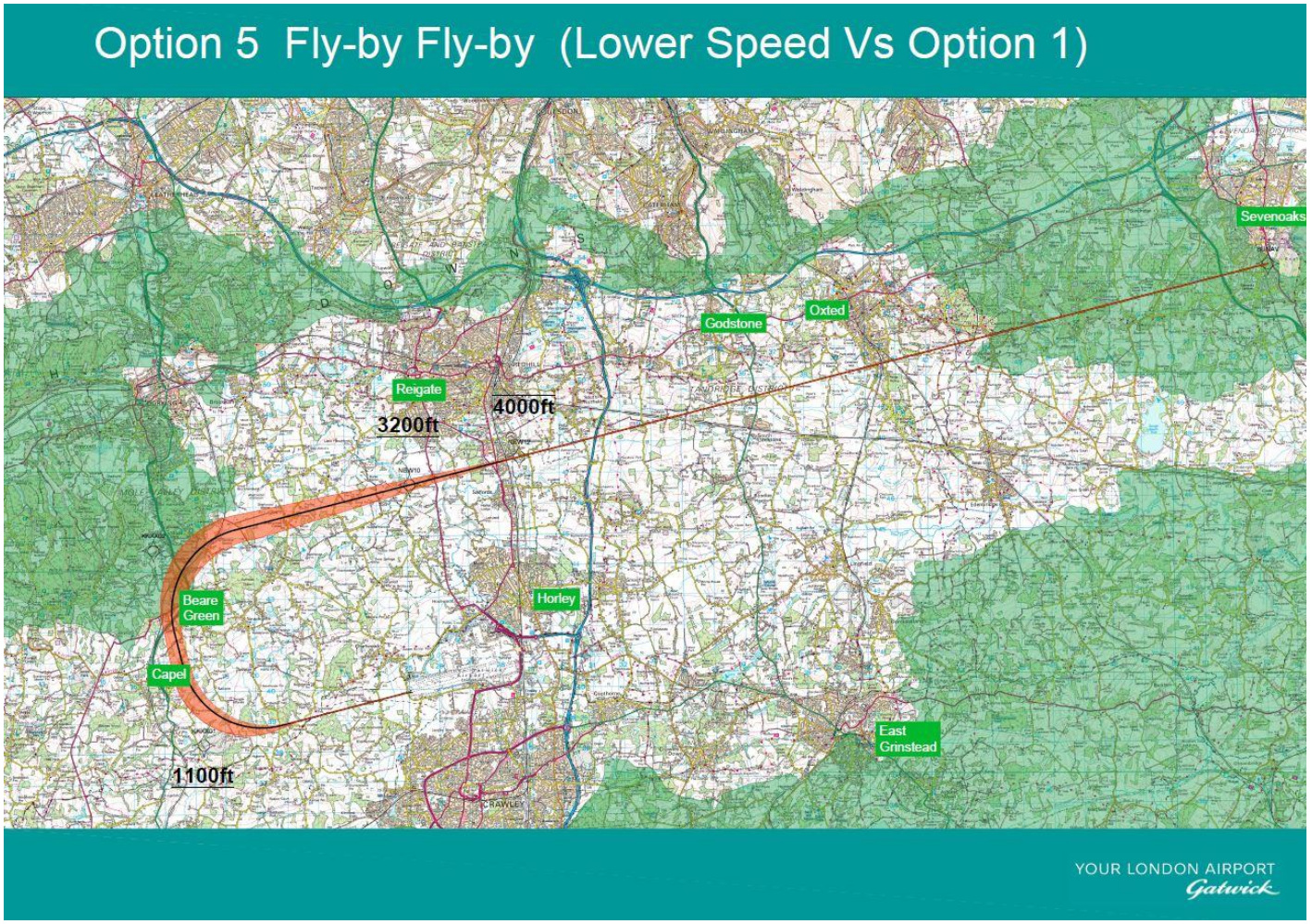
4.6 Option 5


Option 5 Fly-by Fly-by (Lower Speed Vs Option 1)
Sevenoaks
Oxted
Godstone
Reigate
3200ft
4000ft
Beare Green
Horley
Capel
1100ft
East Grinstead
CRAWLEY
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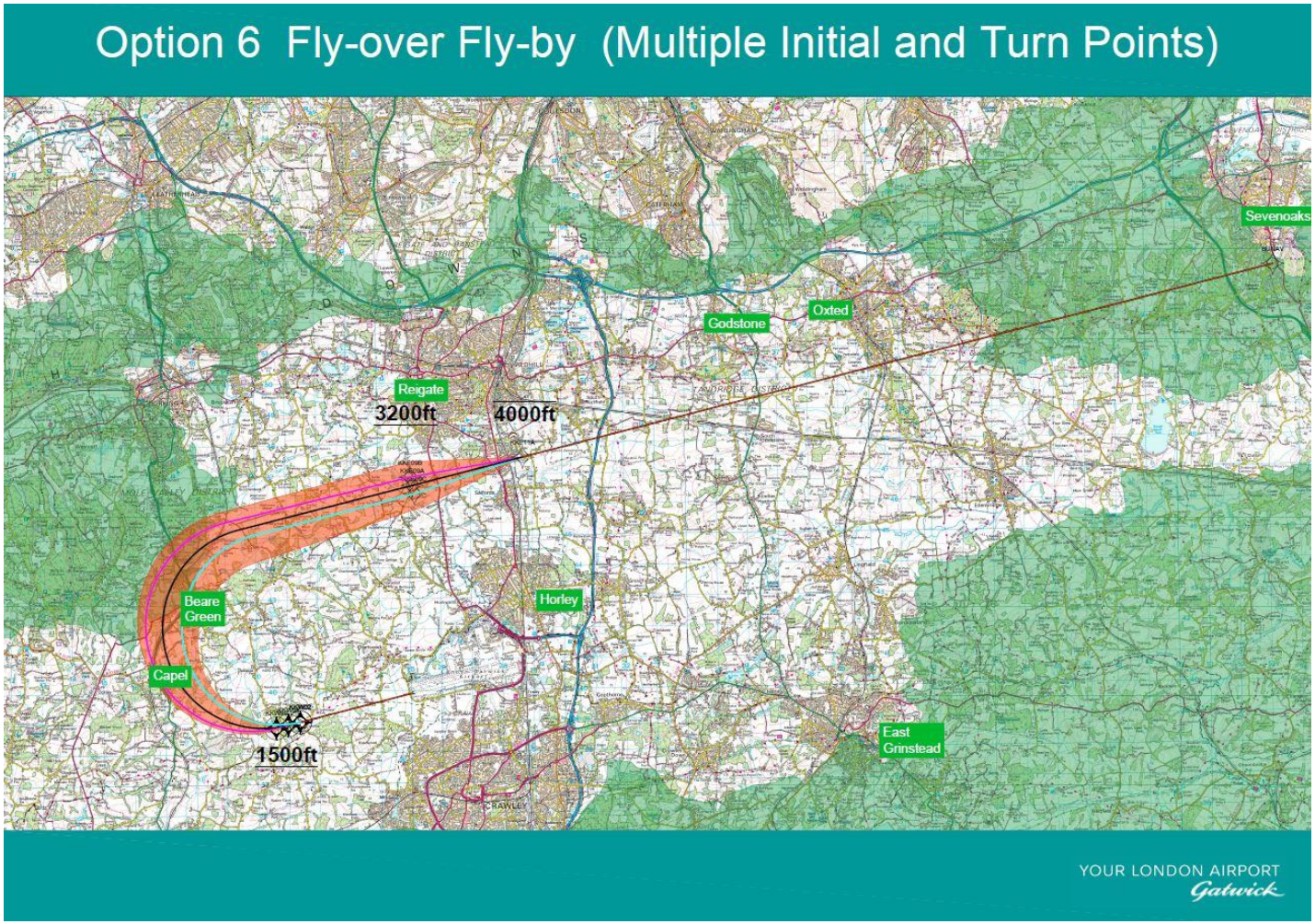
4.7 Option 6


Option 6 Fly-over Fly-by (Multiple Initial and Turn Points)
Sevenoaks
Oxted
Godstone
Reigate
3200ft
4000ft
Beare Green
Capel
Horley
1500ft
East Grinstead
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4.8 Option 7 (Demonstrating a concentrated track over the ground and not indicative of the final design)