# London Biggin Hill Airport ACP-2019-86

## Stage 2 Design Principles Evaluation Gateway 2

# Document Details

| Reference | Description |
|---|---|
| **Document Title** | London Biggin Hill Airport<br>RNAV (GNSS) Runway 21<br>Airspace Change Proposal<br>ACP-2019-86<br>Stage 2 Design Principles Evaluation Gateway 2 |
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# Table of Contents



## Table of Tables

# 1 Introduction

## 1.1 Background

London Biggin Hill Airport (LBHA) is progressing through the Airspace Change Process as defined by the Civil Aviation Publication (CAP) 1616. This airspace change, if successful, is to introduce a RNAV(GNSS)[1] arrival route in order to:

- Be compliant with EASA Regulatory requirements detailed within IR (EU) 20 18/10 48. This will also meet the requirements within the CAA Airspace Modernisation Strategy.
- Add a layer of resilience to the airport operation by providing a second instrument approach in the event that the current procedure is unavailable.

As part of this redesign, LBHA must follow the guidance provided by the CAA and successfully complete the first 6 stages of CAP 1616. The first of these, Stage 1 (Define), was successfully completed earlier this year. Documentation relating to this stage can be accessed through the CAA Airspace Portal Airspace change portal (caa.co.uk)

This LBHA Airspace Change project is now at the Stage 2 (Develop & Assess). Within this Stage, Step 2A requires the change sponsor to develop a comprehensive list of options and then test these with stakeholders to assist in ensuring that the design options for this arrival route address the Statement of Need and align with the design principles (DP) from Stage 1.

Following the engagement with stakeholders a Design Principle Evaluation (DPE) which describes how the options respond to the design principles is undertaken. This document, therefore, articulates the evaluation of each of the options against the design principles agreed during Stage 1, and forms part of the document set required as evidence to satisfy the Stage 2 Develop & Assess Gateway. This document should be read alongside other Stage 2 documentation uploaded to the CAA Airspace Change portal.

The change sponsor understands that the options that are eventually chosen must also be compliant with the relevant technical criteria as detailed in Appendix F to CAP 1616. Therefore, where an option has been accepted as part of the DPE, a high-level assessment has been undertaken against Appendix F, together with a high-level assessment regarding compatibility and alignment with appropriate regulatory requirements in accordance with para 128 CAP 1616.

## 1.2 Progress So Far

The Statement of Need submitted to the CAA to initiate this ACP stated:

[1] This document refers to 'RNAV (GNSS) approaches' as we have used that term since the start of this ACP. The new term is now 'RNP Approach'. When we refer to RNAV approaches we are specifically referring to LNAV and LPV. These terms relate to the different types of RNP approach. LNAV has lateral guidance only while LPV has lateral and vertical guidance allowing for lower minima. Sometimes these approaches are also referred to as PBN (precision-based navigation)

*"LBHA is proposing to implement an RNAV(GNSS) Instrument Approach Procedure (IAP), with LNAV and LPV Minima to Runway 21. The IAP will be designed for aircraft in Speed Categories A, B, and C and will include an RNAV Missed Approach Procedure. The RNAV(GNSS) IAP will replicate/mimic the existing Runway 21 ILS/DME/VOR[2] procedure. The RNAV(GNSS) Procedure for Runway 21 will not only act as a back-up in the event of an ILS failure, but will also future proof the airfield and provide an alternative to procedures utilising the BIG VOR, which is due to be removed in the near future."*

This is the formal explanation as to why the Airport wishes to make changes within the airspace surrounding the Airport.

Stage 1 of CAP 1616 requires that the airport and stakeholders have input into a set of Design Principles which will subsequently steer and guide the development of the route options. The prioritised Design Principles that passed through the CAP 1616 Gateway 1 is shown in Table 1 below.

| Priority | |
|---|---|
| 1 | SAFETY - New routes must be safe and must not erode current ANSP safety barriers |
| 2 | ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown |
| 3 | COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant |
| 4 | NAVIGATION STANDARDS - New routes must be designed to use PBN |
| 5 | EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies |
| 6 | REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors |

Table 1 - Prioritised Design Principles

## 1.3 Comprehensive List – Options Development

LBHA developed a Comprehensive List of design options, consisting of all the possible options, from radical options through to specific lateral and vertical options, that supported both the Statement of Need and aligned with the design

[2] ILS/DME/VOR Procedures are conventional procedure that utilise ground-based equipment to define the lateral and vertical guidance for the aircraft.

principles. These were shared with stakeholders to ensure that stakeholder interests, expressed through the design principles had been properly understood and accounted for in designing these options. This engagement took place over 4 weeks and consisted of information emailed to the stakeholders and an offer of a Zoom meeting. Due to the COVID restrictions face to face meetings were not appropriate.

Most of the feedback received was positive and accepted that the options presented did represent a Comprehensive List. During the first Zoom session one attendee suggested an additional MAP option to route around RAF Kenley. This was accepted by LBHA and subsequently investigated. It is Option 12 in this document. To ensure stakeholders were aware of this additional option details were emailed out and the discussion at the following 2 Zoom session included this new option.

Engagement materials are available on the CAA Airspace Change Portal.

## 1.4 This Document

This document develops the Long List from the Comprehensive List by showing how the design options respond to the design principles. It uses the standard proforma from Appendix E of CAP 1616 to summarise the results.

It also provides information on whether the options going forward into Step 2B are compliant with the technical criteria detailed in Appendix F and para 128 of CAP 1616.

## 1.5 Context CAP 1616

CAP 1616 is a seven-stage process published by the CAA, those seven stages are:

- Stage 1 – Define
- Stage 2 – Develop and Assess (current stage)
- Stage 3 – Consultation
- Stage 4 – Update and Submit
- Stage 5 – Decide
- Stage 6 – Implement
- Stage 7 – Post-Implementation Review

# 2 Options within the Design Principle Evaluation

## 2.1 Comprehensive List

CAP 1616 requires LBHA to identify all possible options, but also accepts that there may be limited scope for multiple design options due to, for example, the physical constraints of adjacent airspace and/or procedures which does apply in this case. The Comprehensive List and how it was developed is set out in the Stage 2 Design Options Development document.

## 2.2 Options being evaluated

There are 25 arrival options and 5 Missed Approach Procedure (MAP) options from the Comprehensive List that can be evaluated. Apart from Option 1 and Option 8, any of the arrival options can be associated with any MAP. The Table below summarises the variations applied to the options presented.

| Variation Code | Basic Description |
|---|---|
| A | Utilises a 3° final approach angle, which is currently industry standard. |
| B | Utilises a 3.2° final approach angle. |
| C | Utilises a 3.5° final approach angle. |
| T | Utilises a T-bar lateral approach philosophy where aircraft join from either the right- or left-hand side (making a T on the map) of the approach. |
| D | Utilises a direct routing between OSVEV and ALKIN. |

Table 2 – Variation Coding Explained

### 2.2.1 Option 1 Do Nothing

This will mean that when the VOR is removed from service there will be no IFR approach other than the ILS into LBHA on runway 21. In addition, by not implementing a PBN approach LBHA will not be compliant with EASA Regulatory requirements detailed within IR (EU) 20 18/10 48.

### 2.2.2 Option 2A Do Minimum

This option would replicate/mimic the current VOR/DME approach which starts from ALKIN. This assumes radar vectors from OSVEV to enable inbounds to exit the network using extant procedures, or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.0°.

### 2.2.3 Option 2AD

This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN and utilise a new direct link from OSVEV to enable inbounds to exit the network. This assumes radar vectors or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.0°.

### 2.2.4 Option 2B

This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN. This assumes radar vectors from OSVEV to enable inbounds to exit the network using extant procedures, or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.2°

### 2.2.5 Option 2BD

This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN and utilise a new direct link from OSVEV to enable inbounds to exit the network. This assumes radar vectors or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.2°.

### 2.2.6 Option 2C

This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN. This assumes radar vectors from OSVEV to enable inbounds to exit the network using extant procedures, or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.5°

### 2.2.7 Option 2CD

This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN and utilise a new direct link from OSVEV to enable inbounds to exit the network. This assumes radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.5°.

### 2.2.8 Option 5A

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, final approach at 3°

### 2.2.9 Option 5AT

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3°.

**2.2.10 Option 5B**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, final approach at 3.2°

**2.2.11 Option 5BT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.2°.

**2.2.12 Option 5C**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, final approach at 3.5°.

**2.2.13 Option 5CT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.5°.

**2.2.14 Option 6A**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, final approach at 3°

**2.2.15 Option 6AT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3°.

**2.2.16 Option 6B**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, final approach at 3.2°.

**2.2.17 Option 6BT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.2°.

**2.2.18 Option 6C**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, final approach at 3.5°.

**2.2.19 Option 6CT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.5°.

**2.2.20 Option 7A**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, final approach at 3°.

**2.2.21 Option 7AT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3°.

**2.2.22 Option 7B**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, final approach at 3.2°.

**2.2.23 Option 7BT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.2°.

**2.2.24 Option 7C**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, final approach at 3.5°.

**2.2.25 Option 7CT**

From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.5°.

**2.2.26 Option 8 MAP Do Nothing**

This is only possible with Option 1. Any change from the VOR/DME procedure will necessitate a different MAP.

**2.2.27 Option 9 MAP Do Minimum**

Mimic the current right turn MAP to ALKIN and then radar vectors from NATS. This will, however, result in different protection areas due to the design regulations, additionally the ALKIN hold will be laterally different from the conventional one, and radar vectors from NATS after ALKIN will be required as is the case with the VOR/DME procedure.

**2.2.28 Option 10 MAP**

Most efficient left turn out back to ALKIN.

**2.2.29 Option 11 MAP**

Most efficient right turn out back to ALKIN if not Option 9

**2.2.30 Option 12 MAP from stakeholder engagement**

Mimic lateral routing of the Rwy 03 MAP to avoid RAF Kenley.

# 3 Design Principle Evaluation

## 3.1 Assessment

Each option has been assessed against the prioritised list of Design Principles shown in Table 1 in Section 1 above. Table 2 below gives an overview of how well each option aligns to each Design Principle; it shows a summary of the analysis conducted for each option. Greater detail is provided against each option in section 3.2 which shows an assessment of whether the Design Principle is either not met, partially met, or fully met, as follows:

• A green box indicates that the Design Principle **has been met** by the specified option.

• An orange box means that the Design Principle **has been partially met** by the specified option.

• A red box indicates that the Design Principle **has not been met** by the specified option.

When evaluating whether options met the Safety DP the recent Hazard Identification meeting was utilised.

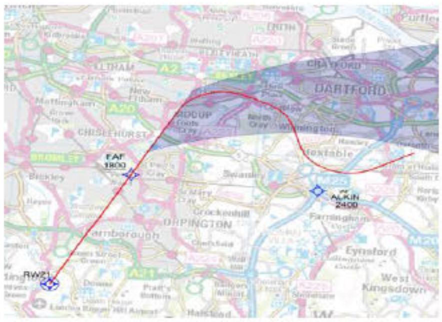
| | DP1 | DP2 | DP3 | DP4 | DP5 | DP6 |
|---|---|---|---|---|---|---|
| Option 1 | Amber | Green | Red | Red | Red | Green |
| Option 2A | Green | Amber | Green | Green | Red | Green |
| Option 2AD | Green | Amber | Green | Green | Amber | Green |
| Option 2B | Green | Amber | Green | Green | Red | Green |
| Option 2BD | Green | Amber | Green | Green | Amber | Green |
| Option 2C | Red | Amber | Green | Green | Red | Green |
| Option 2CD | Red | Amber | Green | Green | Amber | Green |
| Option 5A | Red | Amber | Green | Green | Amber | Amber |
| Option 5AT | Red | Amber | Green | Green | Amber | Amber |
| Option 5B | Red | Amber | Green | Green | Amber | Amber |
| Option 5BT | Red | Amber | Green | Green | Amber | Amber |
| Option 5C | Red | Amber | Green | Green | Amber | Amber |
| Option 5CT | Red | Amber | Green | Green | Amber | Amber |
| Option 6A | Green | Green | Green | Green | Green | Green |
| Option 6AT | Red | Green | Green | Green | Green | Green |
| Option 6B | Green | Green | Green | Green | Green | Green |
| Option 6BT | Red | Green | Green | Green | Green | Green |
| Option 6C | Red | Green | Green | Green | Green | Green |
| Option 6CT | Red | Green | Green | Green | Green | Green |
| Option 7A | Red | Amber | Green | Green | Red | Amber |
| Option 7AT | Red | Amber | Green | Green | Amber | Amber |
| Option 7B | Red | Amber | Green | Green | Red | Amber |
| Option 7BT | Red | Amber | Green | Green | Amber | Amber |
| Option 7C | Red | Amber | Green | Green | Red | Amber |
| Option 7CT | Red | Amber | Green | Green | Amber | Amber |
| Option 8 | Amber | Green | Red | Red | Green | Green |
| Option 9 | Green | Green | Green | Green | Green | Green |
| Option 10 | Red | Red | Green | Green | Green | Red |
| Option 11 | Red | Amber | Green | Green | Red | Amber |
| Option 12 | Amber | Red | Green | Green | Red | Red |

Table 3 – DPE Overview

## 3.2 Detailed Evaluation

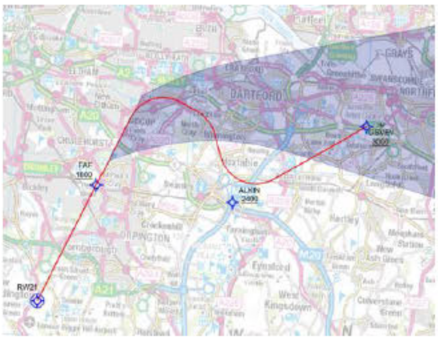
| **Design Principle Evaluation** | | | **OPTION NO: 1** |
|---|---|---|---|
| *Option Name: Do nothing* | | | REJECT |
| *Description of Option: VOR/DME approach remains until 1 Dec 2022 when it will be removed, therefore procedure dies.* | | | |
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Whilst remaining in use the current level of safety remains, when removed a layer of resilience is lost. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* There is no new route to assess, so no new overflight. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The current route is not compliant and with no new route the airport will continue to be non-compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The route is conventional. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* There is no new route to assess, however efficiency was not considered when this was developed. | | | |

| | | | |
|---|---|---|---|
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Whilst remaining in use the current tracks over the ground remain extant, when removed aircraft will route according to other extant procedures. | | | |

| | |
|---|---|
| **Design Principle Evaluation** | **OPTION NO: 2A** |
| *Option Name: Do minimum* | ACCEPT |
| *Description of Option: Replicate/mimic the current VOR/DME approach which starts from ALKIN. This assumes radar vectors from OSVEV to enable inbounds to exit the network using extant procedures, or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.0°.* |  |

| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The procedure design and safety work to date implies that the final design will meet acceptable levels of flight safety. However, this design maintains an extant issue of no network connectivity. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The route has been designed to mimic the current route, but due to the design criteria this does mean that a portion of the route is outside of the main radar vectoring swathe, although this area does still have some current Biggin Hill inbound overflight.<br><br>The glideslope is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |

| | | | |
|---|---|---|---|
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to mimic the current route and not to be efficient. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to replicate as closely as possible the current VOR/DME procedure | | | |

| | |
|---|---|
| **Design Principle Evaluation** | **OPTION NO: 2AD** |
| *Option Name: 2AD* | ACCEPT |
| *Description of Option: This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN and utilise a new direct link from OSVEV to enable inbounds to exit the network. This assumes radar vectors or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.0°.* |  |

| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

| | | | |
|---|---|---|---|
| *Summary of Qualitative Assessment:* The procedure design work to date implies that the final design will meet acceptable levels of flight safety. The proposed link route from OSVEV to ALKIN while introducing a new procedure is not expected to erode the ANSP safety barriers currently in place and will enhance safety as exiting the network is established. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The route has been designed to mimic the current route, but due to the design criteria this does mean that a portion of the route is outside of the main radar vectoring swathe, as is part of the OSVEV ALKIN link, although this area does still have some current Biggin Hill inbound overflight.<br><br>The glideslope is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to mimic the current route and not to be efficient.<br><br>However, the proposed direct link route is the most efficient route in terms of track miles, from OSVEV to ALKIN. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option has been designed to replicate as closely as possible the current VOR/DME procedure from ALKIN to touchdown. The link route from OSVEV to ALKIN is within the current swathe.

| **Design Principle Evaluation** | **OPTION NO: 2B** |
|---|---|
| *Option Name: 2B* | ACCEPT |

*Description of Option: This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN. This assumes radar vectors from OSVEV to enable inbounds to exit the network using extant procedures, or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.2°*


| Design Principle | NOT MET | PARTIAL | MET |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* The procedure design and safety work to date implies that the final design will meet acceptable levels of flight safety. However, this design maintains an extant issue of no network connectivity.

| Design Principle | NOT MET | PARTIAL | MET |
|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* The route has been designed to mimic the current route, but due to the design criteria this does mean that a portion of the route is outside of the main radar vectoring swathe, although this area does still have some current Biggin Hill inbound overflight.

The route has been designed with a slightly increased glideslope.

| Design Principle | NOT MET | PARTIAL | MET |
|---|---|---|---|
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |

| | | | |
|---|---|---|---|
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to mimic the current route and not to be efficient. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to replicate as closely as possible the current VOR/DME procedure | | | |

| | |
|---|---|
| **Design Principle Evaluation** | **OPTION NO: 2BD** |
| *Option Name: 2BD* | ACCEPT |

*Description of Option: This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN and utilise a new direct link from OSVEV to enable inbounds to exit the network. This assumes radar vectors or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.2°.*

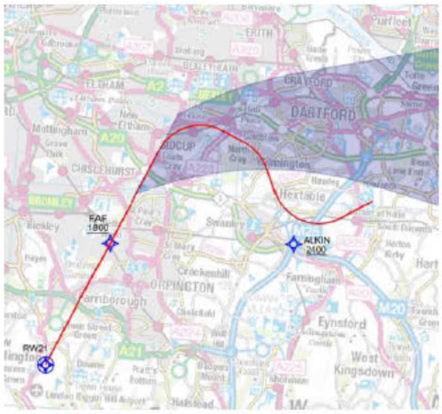

| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

| | | | |
|---|---|---|---|
| *Summary of Qualitative Assessment:* The procedure design work to date implies that the final design will meet acceptable levels of flight safety. The proposed link route from OSVEV to ALKIN while introducing a new procedure is not expected to erode the ANSP safety barriers currently in place and will enhance safety as exiting the network is established. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The route has been designed to mimic the current route, but due to the design criteria this does mean that a portion of the route is outside of the main radar vectoring swathe, as is part of the OSVEV ALKIN link, although this area does still have some current Biggin Hill inbound overflight.<br><br>The route has been designed with a slightly increased glideslope. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to mimic the current route and not to be efficient.<br><br>However, the proposed direct link route is the most efficient route in terms of track miles, from OSVEV to ALKIN. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option has been designed to replicate as closely as possible the current VOR/DME procedure from ALKIN to touchdown. The link route from OSVEV to ALKIN is within the current swathe.

| **Design Principle Evaluation** | **OPTION NO: 2C** |
|---|---|
| *Option Name: 2C* | REJECT |

*Description of Option: This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN. This assumes radar vectors from OSVEV to enable inbounds to exit the network using extant procedures, or radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.5°*




| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:* The procedure design work to date implies that the lateral design will meet acceptable levels of flight safety, however, to reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice..

| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
|---|---|---|---|

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|---|---|---|---|
| *Summary of Qualitative Assessment:* The route has been designed to mimic the current route, but due to the design criteria this does mean that a portion of the route is outside of the main radar vectoring swathe, although this area does still have some current Biggin Hill inbound overflight.<br><br>The route has been designed with a 3.5°glideslope which is the highest possible within the project constraints.<br><br>As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to mimic the current route and not to be efficient. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to replicate as closely as possible the current VOR/DME procedure | | | |

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| **Design Principle Evaluation** | **OPTION NO: 2CD** |
| *Option Name: 2CD* | REJECT |

*Description of Option: This option would be to replicate/mimic the current VOR/DME approach which starts from ALKIN and utilise a new direct link from OSVEV to enable inbounds to exit the network. This assumes radar vectors by NATS for inbounds from the MAP or the south as is the current practice for the VOR/DME approach. The glideslope is at 3.5°.*


| Design Principle | Not Met | Partial | Met |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* The procedure design work to date implies that the lateral design will meet acceptable levels of flight safety. The proposed link route from OSVEV to ALKIN while introducing a new procedure is not expected to erode the ANSP safety barriers currently in place and will enhance safety as exiting the network is established.

However, to reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice..

| Design Principle | Not Met | Partial | Met |
|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* The route has been designed to mimic the current route, but due to the design criteria this does mean that a portion of the route is outside of the main radar vectoring swathe, as is part of the OSVEV ALKIN link, although this area does still have some current Biggin Hill inbound overflight.

The route has been designed with a 3.5°glideslope which is the highest possible within the project constraints.

As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today.

| Design Principle | Not Met | Partial | Met |
|---|---|---|---|
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option is compliant

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| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to mimic the current route and not to be efficient.<br><br>However, the proposed direct link route is the most efficient route in terms of track miles, from OSVEV to ALKIN. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed to replicate as closely as possible the current VOR/DME procedure from ALKIN to touchdown. The link route from OSVEV to ALKIN is within the current swathe. | | | |

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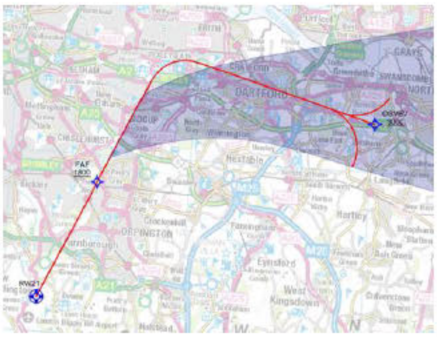
| **Design Principle Evaluation** | **OPTION NO: 5A** |
| *Option Name: 5A* | REJECT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, final approach at 3°.* |  |

| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload. | | | |

LONDON BIGGIN HILL AIRPORT
BUSINESS | TRAVEL | COMMUNITY

| | | | |
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| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>The glideslope is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has more track miles than option 6 but less than option 7. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel | | | |
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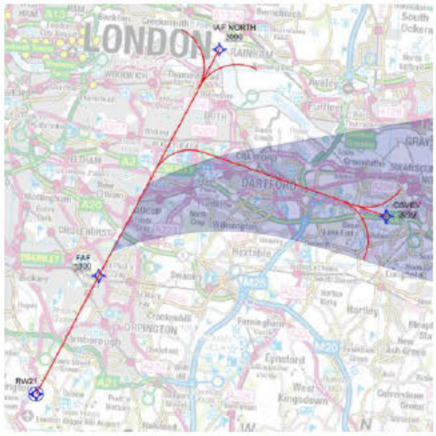
| **Design Principle Evaluation** | **OPTION NO: 5AT** |
| *Option Name: 5AT* | REJECT |

LONDON BIGGIN HILL AIRPORT

BUSINESS | TRAVEL | COMMUNITY

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3°.*




| Design Principle | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

| Design Principle | | | |
|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.

The additional link mimics the effect that is seen with extant procedures.

The glideslope is the industry standard.

| Design Principle | | | |
|---|---|---|---|
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option is compliant

| Design Principle | | | |
|---|---|---|---|
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option is designed using PBN.

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| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option has more track miles than option 6 but less than option 7.

The addition of a new link could aid the flow of traffic.

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| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures.

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| **Design Principle Evaluation** | **OPTION NO: 5B** |
| *Option Name: 5B* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, final approach at 3.2°.*


| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

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|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>Additionally this option provides a slightly steeper final approach angle. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has more track miles than option 6 but less than option 7. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel | | | |

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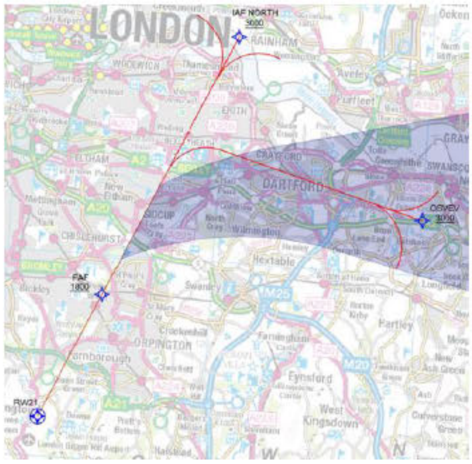
|---|---|
| **Design Principle Evaluation** | **OPTION NO: 5BT** |
| *Option Name: 5BT* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.2°.*




| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

| | | | |
|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.

The additional link mimics the effect that is seen with extant procedures.

Additionally this option provides a slightly steeper final approach angle.

| | | | |
|---|---|---|---|
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option is compliant

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| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option is designed using PBN.

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|---|---|---|---|
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has more track miles than option 6 but less than option 7.<br><br>The addition of a new link could aid the flow of traffic. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures. | | | |

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| **Design Principle Evaluation** | **OPTION NO: 5C** |
| *Option Name: 5C* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, final approach at 3.5°.*


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|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:*<br>This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.<br><br>To reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice.. | | | |

| | | | |
|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>Additionally this option provides a 3.5°glideslope which is the highest possible within the project constraints.<br><br>As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has more track miles than option 6 but less than option 7. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring swathe | | | |

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|---|---|
| **Design Principle Evaluation** | **OPTION NO: 5CT** |
| *Option Name: 5CT* | REJECT |

Original

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing through the centre of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.5°.*


| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:*
This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

To reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice..

| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight. The additional link mimics the effect that is seen with extant procedures.

Additionally this option provides a 3.5°glideslope which is the highest possible within the project constraints.

As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today.

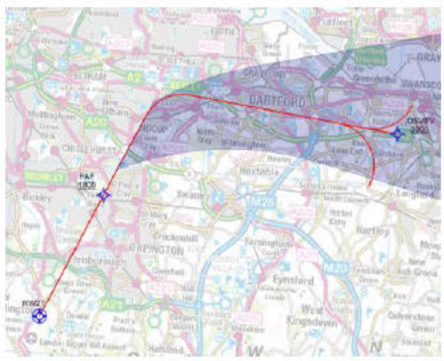
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:* This option is compliant

| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
|---|---|---|---|
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |

| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
|---|---|---|---|
| *Summary of Qualitative Assessment:* This option has more track miles than option 6 but less than option 7.<br><br>The addition of a new link could aid the flow of traffic. | | | |

| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
|---|---|---|---|
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures. | | | |

| **Design Principle Evaluation** | **OPTION NO: 6A** |
|---|---|
| *Option Name: 6A* | ACCEPT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, final approach at 3°.* |  |



| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
|---|---|---|---|

| | | | |
|---|---|---|---|
| *Summary of Qualitative Assessment:* The procedure design and safety work to date implies that the final design will meet acceptable levels of flight safety. This design would reduce the need for radar vectors for traffic leaving the network at OSVEV. The positioning with respect to the London City zone/operations is similar to the radar vectoring of today and would be addressed in the same manner. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* All of this route lies within the current radar vectoring swathe.<br><br>The glideslope utilised is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed with the minimum of track miles possible and is the shortest of all the comparable options. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is fully within the current radar vectoring funnel. | | | |
| | | | |
| **Design Principle Evaluation** | | **OPTION NO: 6AT** | |

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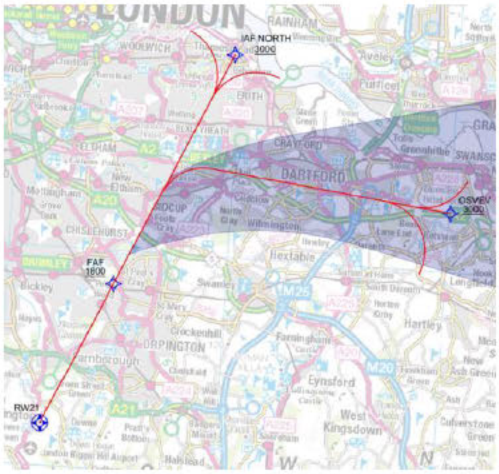
|---|---|---|---|
| *Option Name: 6AT* | | | REJECT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3°.* |  | | |
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment: All* of this route lies either within the current radar vectoring swathe, or for the additional link, it mimics the effect that is seen with extant procedures and therefore has some current Biggin Hill inbound overflight.<br><br>The glideslope is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |

| | | | |
|---|---|---|---|
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed with the minimum of track miles possible from OSVEV and is the shortest of all the comparable options. The addition of a new link could aid the flow of traffic. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is fully within the current radar vectoring funnel and the additional link mimics the effect that is seen with extant procedures. | | | |

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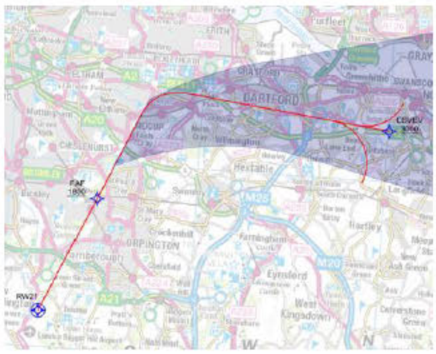
|---|---|
| **Design Principle Evaluation** | **OPTION NO: 6B** |
| *Option Name: 6B* | ACCEPT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, final approach at 3.2°.* |  |

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|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The procedure design and safety work to date implies that the final design will meet acceptable levels of flight safety. This design would reduce the need for radar vectors for traffic leaving the network at OSVEV. The positioning with respect to the London City zone/operations is similar to the radar vectoring of today and would be addressed in the same manner. | | | |

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| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment: All* of this route lies within the current radar vectoring swathe and provides a slightly steeper descent. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed with the minimum of track miles possible is the shortest of all the comparable options. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is fully within the current radar vectoring funnel. | | | |

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|---|---|
| **Design Principle Evaluation** | **OPTION NO: 6BT** |
| *Option Name: 6BT* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.2°.*

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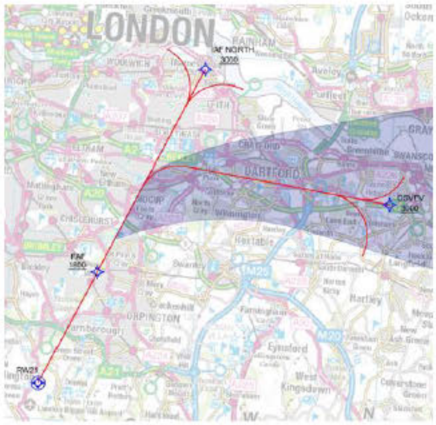


| Design Principle | NOT MET | PARTIAL | MET |
| --- | --- | --- | --- |
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET (red) | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

| Design Principle | NOT MET | PARTIAL | MET |
| --- | --- | --- | --- |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET (green) |

*Summary of Qualitative Assessment:* All of this route lies either within the current radar vectoring swathe, or for the additional link, it mimics the effect that is seen with extant procedures and therefore has some current Biggin Hill inbound overflight.

It provides a slightly steeper final approach angle.

| Design Principle | NOT MET | PARTIAL | MET |
| --- | --- | --- | --- |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET (green) |

*Summary of Qualitative Assessment:* This option is compliant

| Design Principle | NOT MET | PARTIAL | MET |
| --- | --- | --- | --- |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET (green) |

*Summary of Qualitative Assessment:* This option is designed using PBN.

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| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed with the minimum of track miles possible from OSVEV and is the shortest of all the comparable options. The addition of a new link could aid the flow of traffic. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is fully within the current radar vectoring funnel and the additional link mimics the effect that is seen with extant procedures. | | | |

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| **Design Principle Evaluation** | **OPTION NO: 6C** |
| *Option Name: 6C* | REJECT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, final approach at 3.5°.* |  |

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|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* The procedure design and safety work to date implies that the final design will meet acceptable levels of flight safety. This design would reduce the need for radar vectors for traffic leaving the network at OSVEV. The positioning with respect to the London City zone/operations is similar to the radar vectoring of today and would be addressed in the same manner.

To reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice..

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| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment: All* of this route lies within the current radar vectoring swathe and provides a 3.5°glideslope which is the highest possible within the project constraints.<br><br>As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option has been designed with the minimum of track miles possible and is the shortest of all the comparable options. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is fully within the current radar vectoring funnel. | | | |

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| **Design Principle Evaluation** | **OPTION NO: 6CT** |
| *Option Name: 6CT* | REJECT |

LONDON BIGGIN HILL AIRPORT

BUSINESS | TRAVEL | COMMUNITY

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.5°.*

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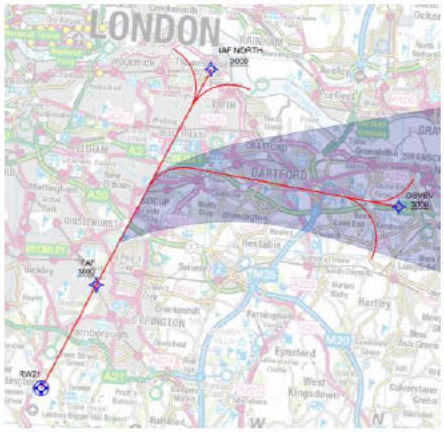


| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET (selected) | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

To reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice..

| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET (selected) |
|---|---|---|---|

*Summary of Qualitative Assessment*: All of this route lies either within the current radar vectoring swathe, or for the additional link, it mimics the effect that is seen with extant procedures and therefore has some current Biggin Hill inbound overflight.

It provides a 3.5° final approach angle, the greatest possible within the design constraints.

As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today.

| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET (selected) |
|---|---|---|---|

*Summary of Qualitative Assessment:* This option is compliant

| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET (selected) |
|---|---|---|---|

*Summary of Qualitative Assessment:* This option is designed using PBN.

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| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option has been designed with the minimum of track miles possible from OSVEV and is the shortest of all the comparable options. The addition of a new link could aid the flow of traffic.

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|---|---|---|---|
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is fully within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures.

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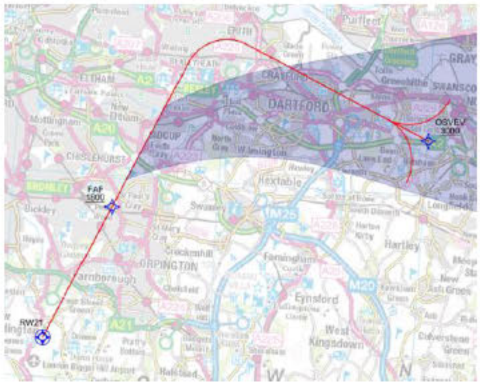
|---|---|
| **Design Principle Evaluation** | **OPTION NO: 7A** |
| *Option Name: 7A* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, final approach at 3°.*

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| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

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| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>The glideslope is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is the longest of the comparable options. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel. | | | |
| | | | |
| **Design Principle Evaluation** | **OPTION NO: 7AT** | | |
| *Option Name: 7AT* | REJECT | | |

LONDON BIGGIN HILL AIRPORT

BUSINESS | TRAVEL | COMMUNITY

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| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3°.* |   | | |
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>The additional link mimics the effect that is seen with extant procedures.<br><br>The glideslope is the industry standard. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |

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|---|---|---|---|
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is the longest of the comparable options.<br><br>The addition of a new link could aid the flow of traffic. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures. | | | |

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|---|---|
| **Design Principle Evaluation** | **OPTION NO: 7B** |
| *Option Name: 7B* | REJECT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, final approach at 3.2°.* |  |

| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |

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|---|---|---|---|
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>Additionally this option provides a slightly steeper final approach angle. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is the longest of the comparable options. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel. | | | |

| **Design Principle Evaluation** | **OPTION NO: 7BT** |
|---|---|
| *Option Name: 7BT* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.2°.*

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| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | **NOT MET** | PARTIAL | MET |

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

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|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | **PARTIAL** | MET |

*Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.

The additional link mimics the effect that is seen with extant procedures.

Additionally this option provides a slightly steeper final approach angle.

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|---|---|---|---|
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | **MET** |

*Summary of Qualitative Assessment:* This option is compliant

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|---|---|---|---|
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | **MET** |

*Summary of Qualitative Assessment:* This option is designed using PBN.

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|---|---|---|---|
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is the longest of the comparable options.<br><br>The addition of a new link could aid the flow of traffic. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures. | | | |

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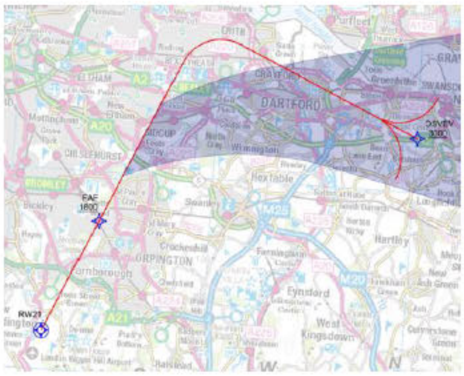
| **Design Principle Evaluation** | **OPTION NO: 7C** |
| *Option Name: 7C* | REJECT |
| *Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the right of the current ILS vectoring swathe, final approach at 3.5°.* | <br> |

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|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.<br><br>To reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice.. | | | |

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|---|---|---|---|
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.<br><br>It provides a 3.5° final approach angle, the greatest possible within the design constraints.<br><br>As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is the longest of the comparable options. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures. | | | |

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| **Design Principle Evaluation** | **OPTION NO: 7CT** |
| *Option Name: 7CT* | REJECT |

*Description of Option: From OSVEV and ignoring ALKIN, to enable inbounds to exit the network using extant procedures, routing down the left of the current ILS vectoring swathe, with the addition of a new route positioned from the north/northeast. Final approach at 3.5°.*

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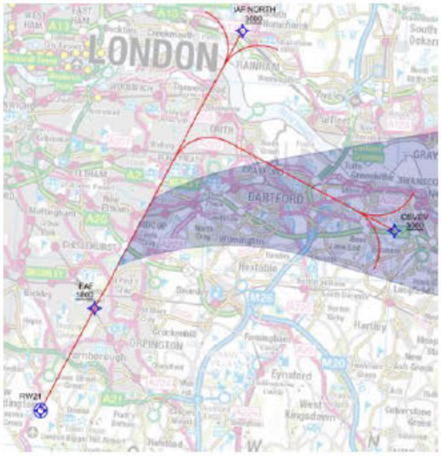


| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:* This option erodes the current ANSP safety barriers in regard to penetration of the London City area of operations. Operations would become dependent and increase in complexity/workload.

To reach the acceptable level of safety in the vertical plane, it is likely that there will need to be a temperature cap on usage of the RNAV (GNSS) procedure, which would then lead to an extremely complex management scenario regarding fluctuating availability resulting in periods of time when the procedure would be unavailable at short notice..

| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
|---|---|---|---|

*Summary of Qualitative Assessment:* Most of this route lies within the current radar vectoring swathe, however, a small portion is outside this. This area does still have some current Biggin Hill inbound overflight.

The additional link mimics the effect that is seen with extant procedures.

It provides a 3.5° final approach angle, the greatest possible within the design constraints.

As the ILS glideslope would also be raised then a greater proportion of aircraft would be higher than today.

| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
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*Summary of Qualitative Assessment:* This option is compliant

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| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is designed using PBN. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This option is the longest of the comparable options.<br><br>The addition of a new link could aid the flow of traffic. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* While not replicating the current VOR procedure this design is mostly within the current vectoring funnel, and the additional link mimics the effect that is seen with extant procedures. | | | |

**Note: For the DPE of the MAP options below the spirit of the DP has been utilised (e.g. Arrival route is assessed as MAP route)**

| **Design Principle Evaluation** | | | **OPTION NO: 8** |
|---|---|---|---|
| *Option Name: Do nothing* | | | REJECT |
| *Description of Option: VOR/DME MAP remains until 1 Dec 2022 when it will be removed* | | | |
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Whilst remaining in use the current level of safety remains, when removed a layer of resilience is lost. | | | |

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| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* There is no new route to assess, so no new people overflown | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The current MAP cannot remain once the arrival procedure is withdrawn, nor can it be reused with a PBN approach | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The current route is conventional and there is no new route. | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* There is no new route to assess, so no change to today | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Whilst remaining in use the current tracks over the ground remain extant, when removed aircraft will route according to other extant procedures expected to be within the current swathe | | | |

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| **Design Principle Evaluation** | **OPTION NO: 9** |
| *Option Name: MAP Do minimum* | ACCEPT |

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| *Description of Option: Mimic the current right turn MAP to ALKIN and then radar vectors from NATS. This will, however, result in different protection areas due to the design regulations, additionally the ALKIN hold will be laterally different, as RNAV, from the conventional one.* |   | | |
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The procedure design and safety work to date implies that the final design will meet acceptable levels of flight safety. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The populations overflown due to the PBN design will experience MAP overflight currently due to the variation in flying the current procedure. | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The design will be compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The design uses PBN | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This design mimics the current route and therefore has minimal impact on subsequent arrivals as it utilises the overhead and does not impose inbound restrictions | | | |

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| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Designed to mimic the current MAP | | | |

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|---|---|
| **Design Principle Evaluation** | **OPTION NO: 10** |
| *Option Name: 10 MAP* | REJECT |

*Description of Option: Most efficient left turn out back to ALKIN.*

*The ALKIN hold will be laterally different, as RNAV, from the conventional one.*


| | | | |
|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Routing interacts with Gatwick traffic and therefore erodes current barriers. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* New populations are likely to be overflown due to the PBN design criteria | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The design will be compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |

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|---|---|---|---|
| *Summary of Qualitative Assessment:* The design uses PBN | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Track miles reduced to the minimum for a left turn out. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This route does not consider any replication. | | | |

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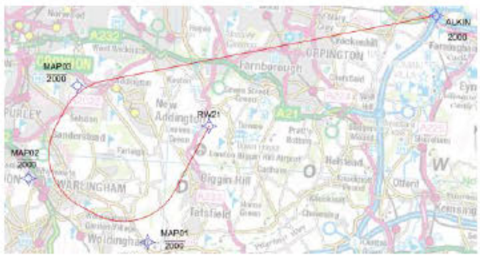
| **Design Principle Evaluation** | **OPTION NO: 11** |
| *Option Name: 11 MAP* | REJECT |
| *Description of Option: Most efficient right turn out back to ALKIN.* |  |



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|---|---|---|---|
| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Erosion of the current safety barriers as this option gets nearer to Kenley and this option will bring the MAP into conflict with inbound LBHA traffic which would require operational management. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* New populations likely to be overflown due to the PBN design criteria | | | |

| | | | |
|---|---|---|---|
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The design will be compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* The design uses PBN | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Operationally inefficient due to tactical management of the MAP coming into conflict with inbounds increasing controller workload/complexity. | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment: Option* does not go through the overhead but direct to ALKIN. | | | |

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| **Design Principle Evaluation** | **OPTION NO: 12** |
| *Option Name: 12 MAP* | REJECT |
| *Description of Option: Route around Kenley* |  |

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| **Design Principle 1:** SAFETY - New routes must be safe and must not erode current ANSP safety barriers | NOT MET | PARTIAL | MET |

Original

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|---|---|---|---|
| *Summary of Qualitative Assessment:* This option would take aircraft in close proximity to the Gatwick zone/operations and keeps the aircraft in Class G for longer than any of the others. | | | |
| **Design Principle 2:** ENVIRONMENTAL CONCERNS - Arrival routes should, where possible, be designed to minimise the impact of noise below 7,000' and should avoid the overflight of populations not previously overflown | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Lots of new overflight | | | |
| **Design Principle 3:** COMPLIANCE - Routes should, where possible, be designed to be PANS Ops compliant | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* PANS Ops compliant | | | |
| **Design Principle 4:** NAVIGATION STANDARDS - New routes must be designed to use PBN | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* Designed to PBN standards | | | |
| **Design Principle 5:** EFFICIENT ROUTES - Arrival routes should, where possible, be designed to minimise emissions and optimise operational efficiencies | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* This is the longest MAP routing | | | |
| **Design Principle 6:** REPLICATION - Procedure should, where possible mimic the existing procedure and/or the existing ILS positioning by ATC vectors. | NOT MET | PARTIAL | MET |
| *Summary of Qualitative Assessment:* No effort to replicate | | | |

Table 4 – Detailed DPE

# 4 Technical Criteria

## 4.1 Assessment

Each ACCEPT option is now subject to a high-level assessment against the technical criteria in Appendix F of CAP 1616, this is to ensure that whichever option is eventually chosen will be compliant with the required technical criteria. As Appendix F should not be completed until Stage 4 this is a very high-level assessment.

That high level assessment confirms that all the options accepted within the DPE, except Options 1 and 8, are considered to be consistent and compatible with the appropriate regulatory requirements and specifically meet the PANS Ops criteria. At this stage, none of the options proceeding to Step 2B for development are identified as requiring any unusual or exceptional safety or technical work.

# 5 Results

## 5.1 Options taken forward

In accordance with CAP 1616 Appendix E format each of the options has been assessed as ACCEPT or REJECT.

Options have been marked as REJECT only when the Safety Design Principle (DP1) has not been met. Some other DPs have resulted in RED and AMBER assessments; however, these will be taken forward into the IOA where they meet the high-level technical criteria assessment.

The options progressed into Step 2B of Stage 2 as future route possibilities are 2A, 2AD, 2B, 2BD, 6A, 6B, 9 and 12, these options are known as the Long List.