# London Biggin Hill Airport RWY 21 RNAV(GNSS) IAP

## Safety Case Report Part 2 and 3

Date: 23rd September2024
Revision: Issue 1
Osprey Ref: 71372 029


Harston Mill, Royston Road Harston, Cambridge CB22 7GG
01172 422533 / enquiries@ospreycsl.co.uk
Registered in England and Wales under No: 06034579

# Document Details

| Reference | Description |
|---|---|
| **Document Title** | London Biggin Hill Airport RWY 21 RNAV(GNSS) IAP |
| | Safety Case Report Part 2 and 3 |
| **Document Ref** | 71372 029 |
| **Issue** | Issue 1 |
| **Date** | 23rd September2024 |
| **Client Name** | London Biggin Hill Airport |
| **Classification** | Commercial in Confidence |

| Issue | Amendment | Date |
|---|---|---|
| Issue 1 | Initial Issue | 23rd September 2024 |

# Executive Summary

London Biggin Hill Airport (LBHA) is seeking to undertake an airspace change in order to update the means of navigation used by aircraft, in line with the overall United Kingdom airspace modernisation.

LBHA is proposing to introduce an Area Navigation (RNAV) (Global Navigation Satellite System (GNSS)) Instrument Approach Procedure (IAP), with Lateral Navigation and Vertical Guidance Minima to Runway 21 (RWY21).

During Stage 2 of the ACP process, LBHA also considered the introduction of PBN to ILS . This would provide resilience that was effectively removed by the unavailability of European Geostationary Navigation Overlay Service (EGNOS) agreement. This procedure was considered feasible and LBHA are also proposing to introduce an RNP to ILS IAP with ILS and LOC/DME Minima as part of this ACP.

Both LBHA and the Civil Aviation Authority (CAA) Safety and Airspace Regulation Group (SARG) require assurance that the introduction of the RWY21 RNAV(GNSS) IAP at LBHA will result in safe air operations at all stages of its implementation lifecycle. The form of this assurance is an operationally focused Safety Case, structured in four parts as recommended by the LBHA Safety Management System (SMS) Manual [Ref. 01].

This document combines the Part 2 and Part 3 Safety Case Reports (Safety of Design and Safety of Transition into Service) to provide assurance evidence that the design and transition arrangements of the new Instrument Flight Procedures (IFPs) meet the Safety Requirements defined in Part 1 Safety Case Report [Ref. 02].

# Table of Contents

**Executive Summary** ..... **iii**

**1 Introduction** ..... **1**

1.1 General ..... 1
1.2 Purpose ..... 1
1.3 Scope ..... 1
1.4 Document Structure ..... 1

**2 Safety Objectives and Safety Requirements** ..... **3**

2.1 Introduction ..... 3
2.2 Identified Hazards ..... 3
2.3 Safety Requirements ..... 5
2.4 Statutory and Regulatory Requirements ..... 7

**3 Rwy 21 RNP IAP Design** ..... **8**

3.1 Overview ..... 8
3.2 Proposed Airspace Design ..... 8
3.3 Proposed Instrument Flight Procedures ..... 11

**4 Design Assurance** ..... **12**

4.1 Overview ..... 12
4.2 Compliance with Derived Safety Requirements ..... 12
4.3 GNSS ..... 14
4.4 Compliance with Derived Safety Requirements ..... 15

**5 Design Dependencies** ..... **16**

5.1 Technical Dependencies ..... 16
5.2 Operational Dependencies ..... 16

**6 Transition Arrangements** ..... **17**

6.1 Overview ..... 17
6.2 Transition Risk Assessment Results ..... 17
6.3 Derived Transition Safety Requirements ..... 17
6.4 Preparation for Implementation ..... 18
6.5 Airspace promulgation ..... 19
6.6 End of Transition Phase ..... 19

**7 Safety Argument and Evidence** ..... **20**

7.1 Top Level Safety Claim ..... 20
7.2 Claim 1 Context ..... 20

7.3 Claim 2 ..... 21

**8 Conclusions and Recommendations ..... 25**

8.1 Safety of Design ..... 25
8.2 Safety of Transition ..... 25
8.3 Development of Safety Case ..... 25

**A1 Table of Acronyms ..... 1-1**

**A2 References ..... 2-1**

**A3 Summary of CAA monitoring of GPS ..... 3-1**

**A4 Compliance with Derived Safety Requirements ..... 4-5**

**A5 Compliance with Transition Safety Requirements ..... 5-1**

**A6 Transition Risk Assessment ..... 6-1**

## Table of Figures

Figure 1 - RNP Approach Runway 21 Option Z ..... 8
Figure 2 - RNP Approach Runway 21 Option Y ..... 9
Figure 3 - RNP to ILS Approach Runway 21 Option Z ..... 10
Figure 4 - RNP to ILS Approach Runway 21 Option Y ..... 10

## Table of Tables

Table 1 – Identified Hazards ..... 5
Table 2 - Derived Safety Requirements ..... 6
Table 3 – Compliance with Derived Safety Requirements ..... 14
Table 4 - ICAO Annex 10 APV-I performance requirements ..... 14
Table 5 – ACP Transition into Service Hazards ..... 17
Table 6 - Transition Safety Requirements ..... 18
Table 7 - Claim 1 Argument and Evidence ..... 21
Table 8 - Claim 2.1 Argument and Evidence ..... 22
Table 9 - Claim 2.2 Argument and Evidence ..... 23
Table 10 - Claim 2.3 Transition ..... 24

# 1 Introduction

## 1.1 General

London Biggin Hill Airport (LBHA) is seeking undertake an airspace change in order to update the means of navigation used by aircraft, in line with the overall United Kingdom (UK) Airspace Modernisation Strategy (AMS).

LBHA is proposing to introduce an Area Navigation (RNAV) (Global Navigation Satellite System (GNSS)) Instrument Approach Procedure (IAP), with Lateral Navigation (LNAV) and Vertical Guidance (LPV) Minima and an RNP to ILS IAP with ILS and LOC/DME Minima to Runway 21 (RWY21), in order to:

- Be compliant with UK Regulatory requirements detailed within UK Reg (EU) 2018/1048. This will also meet the requirements within the Civil Aviation Authority (CAA) AMS.
- Add a layer of resilience to the airport operation by providing a second instrument approach if the current procedure is not available.

## 1.2 Purpose

The CAA published guidance in the form of Civil Air Publication (CAP) 1616, The Process for Changing the Notified Airspace Design in January 2018, which was updated to Version 5 in October 2023, (Ref. 03), aimed at sponsors seeking to formally change the way airspace or procedures are used.

CAP 1616 states that a Safety Assessment is one of four key compliance areas that the CAA will review when making its decision at Stage 5 of the seven-stage airspace change process: the other three compliance areas being Operational and Technical, Consultation Process and Engagement Activities and Environmental Assessment.

The purpose of this Safety Case Report (SCR) is to present assurance evidence that with the introduction of the new RNAV IAP at LBHA, the Safety Objectives and Requirements derived in Safety Case Part 1 are complied with.

## 1.3 Scope

The scope of this document, and the activities described within, is limited to air operations at LBHA and the proposed Rwy 21 RNAV IAP.

## 1.4 Document Structure

The structure of this SCR Part 2 and Part 3 is as follows:

- Section 1 – Introduction.
- Section 2 – Safety Objectives and Requirements.
- Section 3 – Runway 21 Instrument Approach Procedure Designs.
- Section 4 – Design Assurance.

- Section 5 – Design Dependencies.
- Section 6 – Transition Arrangements.
- Section 7 – Safety Argument and Evidence
- Section 8 – Conclusions and Recommendations.
- Annex A1 – Table of Acronyms.
- Annex A2 – References.
- Annex A3 – Summary of CAA monitoring of GPS.
- Annex A4 – Compliance with Derived Safety Requirements.
- Annex A5 – Compliance with Transition Safety Requirements.
- Annex A6 – Transition Safety Assessment.

# 2 Safety Objectives and Safety Requirements

## 2.1 Introduction

The following sections set out the Safety Objectives and Safety Requirements that are applicable to the LBHA Airspace Change Proposal (ACP), as derived in the Part 1 SCR.

## 2.2 Identified Hazards

Below is a list of identified hazards (HAZ) associated with the Biggin Hill ACP. These are detailed in Table 1.

| Haz No. | Hazards | Option Applicability | Description |
|---|---|---|---|
| HAZ 01 | Loss of Navigational Information | All | Aircraft cannot fly the published procedure. |
| HAZ 02 | Corruption of Navigational Information | All | Aircraft does not accurately fly the published procedure. |
| HAZ 03 | Loss/Corruption of Voice Communication (Air-Ground) | All | LBHA Air Traffic Control (ATC) is unable to pass information to aircraft.<br>Pilots are unable to communicate with ground stations. |
| HAZ 04 | Loss/Corruption of Ground Comms to Other Aerodromes/ Agencies | All | Controllers unable to coordinate to ensure safe separation between mixed arrivals and departures. |
| HAZ 05 | Loss of Thames Radar surveillance | All | Aircraft operating in Controlled Airspace (CAS) without appropriate monitoring – controller unable to provide standard separation. |
| HAZ 06 | Corruption of Thames Radar surveillance | All | Aircraft operating in CAS without appropriate monitoring – controller unable to provide standard separation. |
| HAZ 07 | Multiple aircraft using the IAP at any one time. | All | Multiple aircraft may use the IAP at any one time. Differing speeds could result in loss of required separation |
| HAZ 08 | *Hazard related to design option that has been rejected* | | |
| HAZ 09 | *Hazard related to design option that has been rejected* | | |
| HAZ 10 | *Hazard related to design option that has been rejected* | | |
| HAZ 11 | *Hazard related to design option that has been rejected* | | |

| Haz No. | Hazards | Option Applicability | Description |
|---|---|---|---|
| HAZ 12 | *Hazard related to design option that has been rejected* | | |
| HAZ 13 | *Hazard related to design option that has been rejected* | | |
| HAZ 14 | Increased Flight Crew workload | RNP to ILS Approach Runway 21 Option Z<br>RNP to ILS Approach Runway 21 Option Z | Multiple actions are required by the flight crew to perform the MAP. |
| HAZ 15 | *Hazard related to design option that has been rejected* | | |
| HAZ 16 | *Hazard related to design option that has been rejected* | | |
| HAZ 17 | *Hazard related to design option that has been rejected* | | |
| HAZ 18 | *Hazard related to design option that has been rejected* | | |
| HAZ (I)01 | Switch to ILS from RNP | RNP to ILS Approach Runway 21 Option Z<br>RNP to ILS Approach Runway 21 Option Z | Switch to ILS from RNP adds to an already high cockpit workload situation |
| HAZ (I)02 | Switch from RNP to Instrument Landing System is not made | RNP to ILS Approach Runway 21 Option Z<br>RNP to ILS Approach Runway 21 Option Z | Aircraft does not fly the published procedure |
| HAZ (I)03 | Aircraft does not establish on ILS | RNP to ILS Approach Runway 21 Option Z<br>RNP to ILS Approach Runway 21 Option Z | Aircraft systems do not capture the ILS beam |

| Haz No. | Hazards | Option Applicability | Description |
|---|---|---|---|
| HAZ (I)04 | Switching from ILS to RNP (in the case of a MAP) | RNP to ILS Approach Runway 21 Option Z<br>RNP to ILS Approach Runway 21 Option Z | Switch to RNP from ILS adds to an already high cockpit workload situation |
| HAZ (I)05 | Loss of GNSS | All | Aircraft cannot fly the published procedure |

Table 1 – Identified Hazards

## 2.3 Safety Requirements

It is not practical to derive numerical Safety Objectives for all the identified hazards, due to the many unpredictable and unquantifiable factors in the operational environment. For example, the successful implementation of the new Rwy 21 RNP IAP is contingent upon GNSS signal integrity meeting International Civil Aviation Organisation (ICAO) Annex 10 standards for APV operations (Explored in Section 5.3). The assessment of potential hazards associated with this procedure is qualitative, relying on expert judgment and experience to identify and mitigate risks.

The qualitative assessment activities focus on the management of risk: ensuring the existence of barriers to prevent or minimise the occurrence of the identified hazards, or to limit the effects of the hazard where it cannot be prevented. These barriers steer the derivation of Safety Requirements for the ACP.

The Part 1 SCR defined a set of Safety Requirements for the Biggin Hill ACP by identifying mitigations that manage the risks presented by the hazards.

A description of each Safety Requirement, and the hazard/s they mitigate, is listed in Table 2.

| Ref. | Safety Requirement | Linked Hazard |
|---|---|---|
| SR01 | The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to avoid flight into terrain or obstacles. | HAZ 01<br>HAZ 02 |
| SR02 | In the event of a loss of Comms, the Aircraft should follow Loss of Comms procedure as laid out in the AIP entry for LBHA | HAZ 03 |

| Ref. | Safety Requirement | Linked Hazard |
|---|---|---|
| SR03 | LBHA ATC Voice Communications is compliant with the applicable requirements of CAP670, Air Traffic Services Safety Requirements [Ref. 04] | HAZ 03 |
| SR04 | LBHA shall have 2 x direct lines to Thames Radar | HAZ 04 |
| SR05 | LBHA shall have Speed dials via voice switch to local Air Navigation Service Providers (ANSP)/agencies | HAZ 04 |
| SR06 | LBHA shall have an additional speed dial to Redhill | HAZ 04 |
| SR07 | LBHA shall have mobile phone numbers recorded in the Manual of Air Traffic Services (MATS) Part 2 [Ref. 05]. | HAZ 04 |
| SR08 | LBHA MATS Part 2 must cover the process to be followed if surveillance is lost | HAZ 05 |
| SR09 | LBHA Approach Control will provide a Procedural Service for LBHA Instrument Flight Rules (IFR) traffic | HAZ 05<br>HAZ 06 |
| SR10 | LBHA will be able to use advanced Aerodrome Traffic Monitor (ATM) in accordance with Section 2, Chapter 1, para 21 of the MATS Part 1 [Ref. 06] | HAZ 01<br>HAZ 07<br>HAZ14 |
| SR11 | LBHA RWY21 RNAV(GNSS) IAP shall be designed with holding patterns. | HAZ 07 |
| SR12 | *Not Used* | |
| SR13 | *Not used* | |
| SR14 | *Not Used* | |
| SR15 | *Not used* | |
| SR16 | There shall be a speed limit for the RNP to ILS procedure | HAZ (I)01<br>HAZ (I)03 |

Table 2 - Derived Safety Requirements

## 2.4 Statutory and Regulatory Requirements

### 2.4.1 Regulatory Requirements Pertaining to the ACP

A key element of the ACP is the need to demonstrate that the proposed changes comply with the Airspace and Infrastructure requirements as set out in Appendix F of CAP 1616.

These requirements are derived from the Single European Sky (SES) Regulations, ICAO Standards and Recommended Practises (SARPs) and European Civil Aviation Conference (ECAC)/EUROCONTROL requirements; the list also includes additional requirements to satisfy UK policy.

### 2.4.2 Procedure Design Requirements

CAP 785A (Ref. 07) provides guidance on the approval of Instrument Flight Procedures (IFPs) produced by the approved procedure designers.

The criterion for Instrument Flight Procedures (IFP) design in UK Airspace is based on ICAO Document PANS-OPS 8168 (Ref. 08) and CAP 785B [Ref. 09] which provides detail on the format and content of an IFP Design Submission (Chapter 3 of CAP 785B).

Additionally, CAP 670: Air Traffic Services Safety Requirements, section NAV 07 details ATS Requirements for RNAV (GNSS) Instrument Approach Procedures (IAP).

# 3 Rwy 21 RNP IAP Design

## 3.1 Overview

LBHA are responsible for providing the formal instrument procedures into and out of the airport. In this airspace change, LBHA are looking to implement new Instrument Approach Procedures for aircraft arriving at LBHA.

The current existing IAP and associated MAP will shortly be removed from use, as they use navigational facilities on the ground that are reaching the end of life, so will no longer be available. The new procedures, based on satellite navigation, are required to ensure the airport remains resilient by providing a second instrument approach in the event that the ILS is unavailable. These procedures can be integrated into UK airspace, which is currently being modernised to incorporate new technologies, such a Satellite Navigation.

The introduction of a PBN Approach will meet the requirements of the CAA Airspace Modernisation Strategy (AMS) and will remove dependency on ground-based navigation equipment which is currently being phased out in the UK.

## 3.2 Proposed Airspace Design

This section documents the designs for the IAPs and a brief description of each.

### 3.2.1 RNP Approach Runway 21 Option Z

Figure 1 shows the proposed approach from OSVEV.

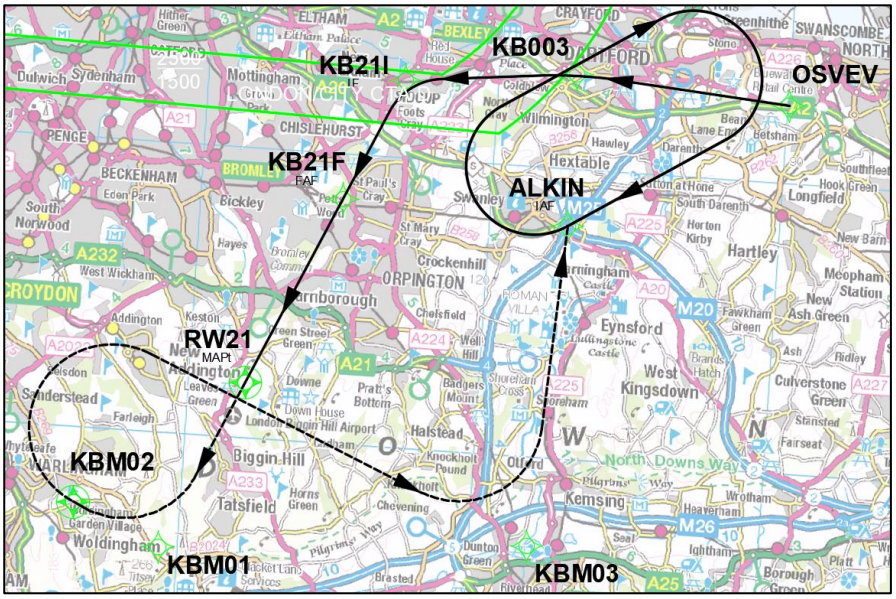


Figure 1 - RNP Approach Runway 21 Option Z

This approach allows aircraft to join the approach from the en-route network at OSVEV. The MAP element of the procedure routes back through the LBHA overhead and remains 2nm clear of RAF Kenley.

### 3.2.2 RNP Approach Runway 21 Option Y

Figure 2 shows the proposed approach from the Hold.

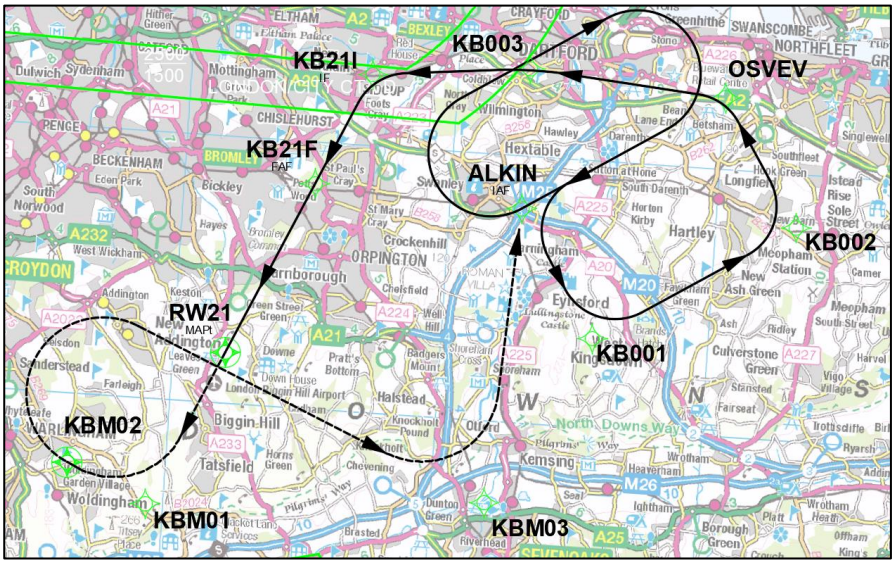


Figure 2 - RNP Approach Runway 21 Option Y

This approach enables aircraft to rejoin the approach from the Hold following a missed approach. The initial part of the procedure allows the aircraft to self-navigate and reposition to make a further approach to the airfield. This approach will only be utilised when radar vectors are not available from ATC, and the aircraft has carried out the MAP. As soon as the aircraft has passed OSVEV, the approach procedure becomes the same as that detailed at RNP Approach Option Z (Section 3.2.1). The MAP element of the procedure routes back through the LBHA overhead and remains 2nm clear of RAF Kenley.

### 3.2.3 RNP to ILS Approach Runway 21 Option Z

Figure 3 shows the proposed approach from OSVEV.

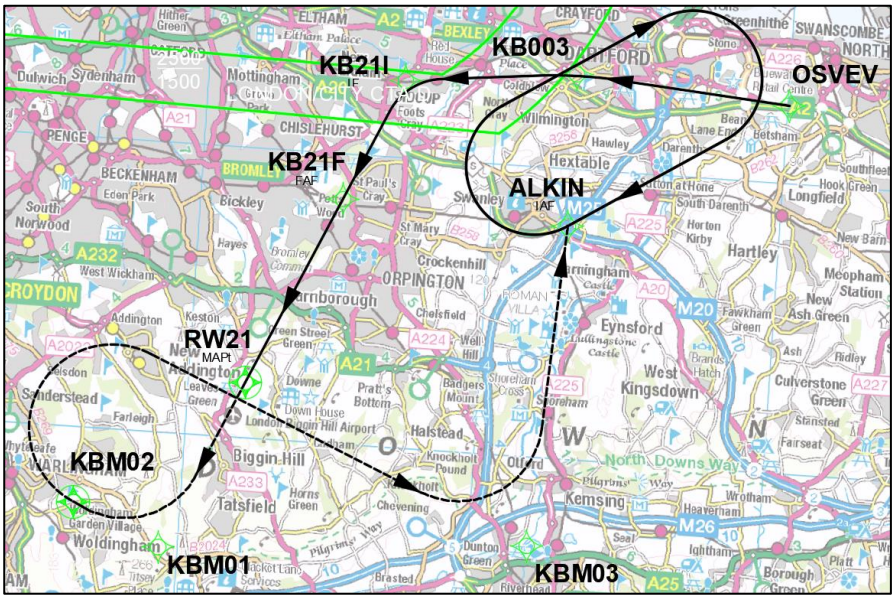


Figure 3 - RNP to ILS Approach Runway 21 Option Z

This approach enables the aircraft to intercept the ILS procedure from the en-route network at OSVEV. The MAP for this design replicates that described at RNP Approach Option Z (Section 3.2.1). The MAP element of the procedure routes back through the LBHA overhead and remains 2nm clear of RAF Kenley.

### 3.2.4 RNP to ILS Approach Runway 21 Option Y

Figure 4 shows the proposed approach from the Hold.

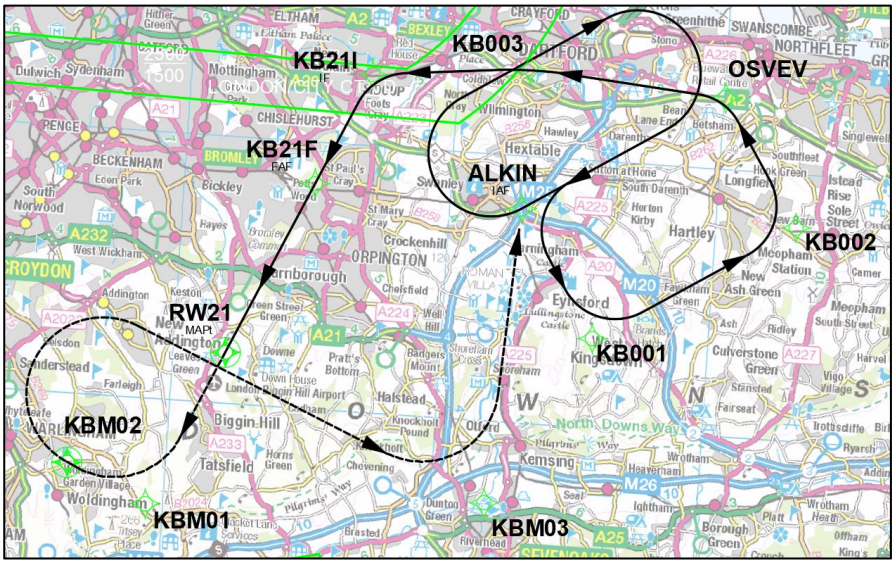


Figure 4 - RNP to ILS Approach Runway 21 Option Y

This approach enables aircraft to rejoin the approach from the Hold following a missed approach. The initial part of the procedure allows the aircraft to self-navigate and reposition to make a further approach to the airfield. This approach will only be utilised when radar vectors are not available from ATC, and the aircraft has carried out the MAP. As soon as the aircraft has passed OSVEV, the approach procedure

becomes the same as that detailed at RNP to ILS Approach Option Z (Section 3.2.3). The MAP element of the procedure routes back through the LBHA overhead and remains 2nm clear of RAF Kenley.

## 3.3 Proposed Instrument Flight Procedures

The proposed new IFPs for LBHA fulfil the following requirements:

- RNP LNAV approach to Runway 21
- RNP LNAV approach to Runway 21 allowing aircraft to rejoin the Hold after a MAP
- RNP ILS approach to Runway 21
- RNP ILS approach to Runway 21 allowing aircraft to rejoin the Hold after a MAP

The proposed IFP designs are detailed in the IFP Design Report [Ref. 10]

# 4 Design Assurance

## 4.1 Overview

This section contains the evidence to demonstrate compliance with the Safety Objectives and Safety Requirements set out in Section 2 of this document.

## 4.2 Compliance with Derived Safety Requirements

Compliance to each of the Derived Safety Requirements is summarised below in Table 3.

| Ref. | Safety Requirement | Compliance | Compliant |
|---|---|---|---|
| SR01 | The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to avoid flight into terrain or obstacles. | See Section 4.3 | Yes |
| SR02 | In the event of a loss of Comms, the Aircraft should follow Loss of Comms procedure as laid out in the AIP entry for LBHA | Given that LBHA is a certified Airport that meets the applicable requirements of CAP670, then there are three levels of voice communication redundancy: Main, Standby and Emergency. Therefore, it is considered that the LBHA Air-Ground Voice Communications system can comply with this Safety Requirements. | Yes |
| SR03 | LBHA ATC Voice Communications is compliant with the applicable requirements of CAP670, Air Traffic Services Safety Requirements | As per SR02 | Yes |

| Ref. | Safety Requirement | Compliance | Compliant |
|---|---|---|---|
| SR04 | LBHA shall have 2 x direct lines to Thames Radar | Compliance by way of an additional means of communication with Thames Radar, Redhill and other ANSPs/Agencies. Therefore, it is considered that this Safety Requirement is achieved. | Yes |
| SR05 | LBHA shall have Speed dials via voice switch to local ANSPs/agencies | As per SR04 | Yes |
| SR06 | LBHA shall have an additional speed dial to Redhill | As per SR04 | Yes |
| SR07 | LBHA shall have mobile phone numbers recorded in MATS Part 2 (with Thames Valley Radar) | As per SR04 | Yes |
| SR08 | LBHA MATS Part 2 must cover the process to be followed if surveillance is lost (this applies to any loss of surveillance radar) | Given that LBHA operate with Thames Radar under current day operations, then the details contained within the LBHA MATS Part 2 should continue to be followed, and a procedural ATC service from LBHA will be utilised. | Yes |
| SR09 | LBHA Approach Control will provide a Procedural Service for LBHA IFR traffic | As per SR08 and additionally, given that LBHA operate with Thames Radar under current day operations, then the details contained within the LBHA MATS Part 2 should continue to be followed. | Yes |
| SR10 | LBHA will be able to use advanced ATM in accordance with Section 2, Chapter 1, para 21 of the MATS Part 1 | See Section 4.3, and additionally, the IAPs will ensure that holding patterns have been established, and LBHA will be able to use advanced ATM in accordance with Section 2, Chapter 1, para 21 of the MATS Part 1. | |

| Ref. | Safety Requirement | Compliance | Compliant |
|---|---|---|---|
| SR11 | LBHA RWY21 RNAV(GNSS) IAP shall be designed with holding patterns. | The IAPs have holding patterns already established, and LBHA will be able to use advanced ATM in accordance with Section 2, Chapter 1, para 21 of the MATS Part 1 | Yes |
| SR12 | Hazard has been removed and SR not required. | N/A | N/A |
| SR13 | Hazard has been removed and SR not required. | N/A | N/A |
| SR14 | Hazard has been removed and SR not required. | N/A | N/A |
| SR15 | Hazard has been removed and SR not required. | N/A | N/A |
| SR16 | There shall be a speed limit for the RNAV to ILS procedure | A speed limit has been included within the design options. | Yes |

Table 3 – Compliance with Derived Safety Requirements

## 4.3 GNSS

The successful use of the new Rwy 21 RNP IAP is reliant upon the GNSS providing the assurance, credibility and confidence that the Signal in Space (SiS) continues to meet the requirements listed in ICAO Annex 10 Volume 1 Radio Navigation Aids (Ref. 11), table 3.7.2.4-1 to be able to support Approach with Vertical Guidance (APV) operations (replicated below in Table 4); this is demonstrated in Annex A3. These exceed the derived Safety Objectives for Hazards Haz01, Haz02, and Haz (I)05.

| Typical operation | Accuracy horizontal 95% | Accuracy vertical 95% | Integrity | Time-to-alert | Continuity | Availability |
|---|---|---|---|---|---|---|
| ICAO (APV-I) Performance Requirement | 16.0 m (52 ft) | 20 m (66 ft) | $1\text{-}2\times10^{-7}$ In any approach | 10 s | $1\text{–}8\times10^{-6}$ per 15 s | 0.99 to 0.99999 |

Table 4 - ICAO Annex 10 APV-I performance requirements

The GNSS SiS has no internal monitoring system to give timely warning of incorrect guidance being transmitted. The UK CAA makes available historical monitoring data to allow the assessment of the integrity and continuity of service; see https://www.caa.co.uk/Data-and-analysis/Airspace-and-environment/Airspace/GPS-reports/.

A review of the data shows that, other than during planned outages, the applicable requirements of ICAO Annex 10 are met.

## 4.4 Compliance with Derived Safety Requirements

Details of compliance with the derived Safety Requirements is presented in Appendix A4.

# 5 Design Dependencies

## 5.1 Technical Dependencies

Successful operation of the new RNP Rwy 21 IAP is technically dependent upon:

- Serviceability and Equipage of aircraft navigational systems.
- Availability of GNSS.

## 5.2 Operational Dependencies

The successful operation of the new RNP Rwy 21 IAP is operationally dependent upon:

- Timely promulgation of the new RNP Rwy 21 IAP in the UK AIP.

# 6 Transition Arrangements

## 6.1 Overview

This section gives details of the transition arrangements planned for the implementation of the proposed IAPs.

## 6.2 Transition Risk Assessment Results

An initial Risk Assessment of the transition arrangements for the implementation of the new IAPs commenced on 26th September 2018. The Risk Assessment was carried out by the LBHA Head of Safety and Compliance.

An ACP Transition into Service Hazard Review Meeting was held on XXXXXX.

The Risk Assessment and cause consequence analysis are included at Appendix A6.

The specific safety risks associated with the transition into service of the ACP are listed as transition hazards (Tr_HAZ) in Table 5.

| Hazard No. | Description | Node in Appendix A6 |
|---|---|---|
| Tr_Haz01 | | |
| Tr_Haz02 | | |
| Tr_Haz03 | | |
| Tr_Haz04 | | |

Table 5 – ACP Transition into Service Hazards

Details of how the likelihood of these hazards occurring are minimised, and the consequences mitigated, are given in Appendix A6.

## 6.3 Derived Transition Safety Requirements

Table 6 contains the Safety Requirements derived during the transition phase risk assessment.

| SR Number | Safety Requirement Description | Applicable Hazards |
|---|---|---|
| Tr_SR01 | | |
| Tr_SR02 | | |

| SR Number | Safety Requirement Description | Applicable Hazards |
|---|---|---|
| Tr_SR03 | | |
| Tr_SR04 | | |

Table 6 - Transition Safety Requirements

## 6.4 Preparation for Implementation

### 6.4.1 Compliance with Derived Safety Objectives

Compliance with the Safety Objectives that were derived in the Part 1 SCR is demonstrated in section 4.2.

### 6.4.2 Compliance with Derived Safety Requirements

Compliance with the Safety Requirements that were derived in the Part 1 SCR is demonstrated in Appendix A4.

Compliance with the Transition Safety Requirements that were derived in section 6.2 is demonstrated in Appendix A5.

It is shown that LBHA is either “Compliant” or “Conditionally Compliant” with all the requirements.

“Conditionally Compliant” indicates a requirement for which evidence of compliance is not available at the time of publication of this Safety Case Report. However, for these requirements a plan exists for this evidence to be generated when implementing the LBHA IAPs.

### 6.4.3 Compliance with Regulatory Requirements

The regulatory requirements are identified in section 2.4.

Biggin Hill Airport has followed the ACP process defined in CAP 1616 including compliance with Airspace and Infrastructure requirements in Appendix A, of CAP 1616f. This is demonstrated in the ACP Proposal Document [Ref. 12].

The RNP IAPs have been developed in accordance with CAP785B and ICAO Document PANS-OPS 8168.

Compliance with the Safety Objectives for GNSS (see section 4.3) demonstrates compliance with ATS Requirements for RNP (GNSS) Instrument Approach Procedures in CAP 670, section NAV07.

### 6.4.4 Safety Programme Roles and Responsibilities

LBHA has subcontracted the development of the Biggin Hill Safety Case to OCSL.

The Senior Air Traffic Control Officer (SATCO) at LBHA is responsible for the provision of safe Air Traffic Services at Biggin Hill Airport and has responsibility for obtaining CAA SARG Approvals.

### 6.4.5 Initial Staffing Levels and Training

LBHA has XXX ATCOs. The Training Plan will be endorsed by the LBHA ATC Training Manager and is scheduled to commence for all ATCO XXX months prior to the implementation date. Training will be recorded on staff training records.

All ATCOs will receive a brief on the new IAPs including but not limited to:

- TBC

All ATCOs will receive the training package to familiarise and reinforce the new IAPs and the subsequent airspace requirements.

## 6.5 Airspace promulgation

It is proposed that the CAA SARG will be informed of the change request in the UK AIP in XXXXXX.

The proposed date of promulgation of the airspace change, including the new IAPs is XXXXX (AIRAC XX/XX).

The required changes to the AIP include the following:

## 6.6 End of Transition Phase

The Transition Phase will be considered as completed successfully, six (6) months post promulgation of the new IAPs and on receipt of the Approval from CAA SARG.

# 7 Safety Argument and Evidence

## 7.1 Top Level Safety Claim

The overarching, top-level Safety Claim (Claim 0) is that the use of the new RWY21 RNAV(GNSS) IAP at LBHA will be acceptably safe when introduced into operational use and throughout their in-service usage.

In the context of this Project, 'acceptably safe' means a Risk Classification that is either:

- Acceptable: Risk is considered acceptable but should be reviewed if it reoccurs or changes that affect the risk are made. Acceptable risks may be signed off by the Safety Manager, Head of Department (listed in Review), the Operations Director or the Accountable Manager.
- Review: The level of risk is of concern and mitigation measures are required to reduce the level of risk to as low as reasonably practicable. Where further risk reduction/mitigation is not practical or viable, the risk may be accepted, provided that the risk is understood and has the endorsement of the Accountable Manager or Head of Department (SATCO, SAFO, Operations Director, Head of Airport Operations, Head of Fixed Base Operations, CFO, BDD).

The above terms are as defined in the LBHA SMS Manual.

In order to demonstrate Claim 0 is valid, it is necessary to support it with two subsidiary claims, namely:

- Claim 1: The extant operation at LBHA is acceptably safe.
- Claim 2: The use of the RWY21 RNAV(GNSS) IAP at LBHA will be acceptable safe.

The underpinning Arguments and Evidence are developed in the following paragraphs.

## 7.2 Claim 1 Context

Claim 1 represents the current operational situation at LBHA and establishes the baseline against which all further claims are substantiated. It demonstrates that the in-use Concept of Operations is acceptably safe and that any local issues are understood; importantly it makes no statement about assuring future safety. This is necessary to show there are no inherent issues with the current operation at LBHA that may ultimately prejudice the safety of the RWY21 RNAV(GNSS) IAP implementation.

It is therefore necessary to show there are no inherent issues with the current system that may ultimately prejudice the safety of the airspace implementation.

| Ref | Argument | Evidence | Rationale |
|---|---|---|---|
| 1.1 | LBHA is an Aerodrome Licensed by CAA | LBHA holds a current Ordinary Aerodrome Licence (Number UKNEGKB-001).<br>Aerodrome is therefore subject to regular audit by the CAA. | CAA has statutory responsibility to regulate ATS safety within the UK under the Air Navigation Order. |
| 1.2 | Safety is proactively managed | Safety related ATS procedures are set out in the LBHA Aerodrome Manual [Ref. 13] LBHA MATS Part 2 and LBHA SMS Manual. | Adherence to proven procedures can reduce likelihood of an incident.<br>Effective safety oversight can correct reductions in safety before an incident can occur. |
| 1.3 | The current ATS achieves a tolerable level of service level incidents. | Mandatory Occurrence Reports (MORs) and Airfield and ATC Occurrence Reporting are detailed in the LBHA Aerodrome Manual, Section 3, Chapter 10 "Occurrence Reporting".<br>Analysis of UK Airprox reports has revealed no trend in incidents involving LBHA aircraft. | Any significant deficiencies are likely to be detected. |

Table 7 - Claim 1 Argument and Evidence

## 7.3 Claim 2

### 7.3.1 Context

The design and implementation of the RWY21 RNAV(GNSS) IAP will require that any change from the current operational characteristics and aviation environment is identified, as must the practises and procedures that manage any safety risk arising from the change. This includes any change in the interaction with other interested parties, e.g. other airspace users and adjacent airports.

It is imperative that the transition into use of the RWY21 RNAV(GNSS) IAP is subjected to a managed process that ensures all the safety claims relating to the ATS remain valid from the point of first use and throughout operational lifetime of the IAP, including the assurance that all external Stakeholders are prepared for the revised operational environment.

Claim 2 is supported by four sub-claims:

- Claim 2.1: All hazards pertaining to the introduction and use of the RWY21 RNAV(GNSS) IAP have been identified and understood, including those associated with other airspace users, adjacent airports and aviation organisations.
- Claim 2.2: The submitted design for the RWY21 RNAV(GNSS) IAP is deemed acceptably safe and agreed by the CAA.
- Claim 2.3: The Programme for transitioning the RWY21 RNAV(GNSS) IAP into operational use is planned and acceptably safe.
- Claim 2.4: The use of the RWY21 RNAV(GNSS) IAP will remain acceptably safe during use.

The intended approach for satisfying these Claims is set out in the following sections.

### 7.3.2 Claim 2.1 – Introduction and Use

All hazards pertaining to the introduction and use of the RWY21 RNAV(GNSS) IAP have been identified and understood, including those associated with other airspace users, adjacent airports and aviation organisations.

| Ref | Argument | Evidence | Rationale |
|---|---|---|---|
| 2.1.1 | All credible functional hazards and mitigations have been identified. | Hazard Identification (HazID) involving all key Stakeholders and based upon the proposed RWY21 RNAV(GNSS) IAP in the context of LBHA airspace is described in the Safety Case Part 1.<br>Due to the development of Design Options over the project life, 3 HazIDs have taken place in that time, and each record is captured at the following references.<br>HazID 1 Record [Ref. 14], Meeting Notes HazID 2 [Ref. 15] and Meeting Notes HazID 3 [Ref. 16] | HazID conducted with suitably qualified personnel involving all key Stakeholders. Hazard gathering should therefore be comprehensive. |
| 2.1.2 | Safety Requirements have been specified that reduce the risks associated with the hazards to a level that is Acceptable and/or Review (in accordance with the LBHA MM) | Safety Requirements are specified in the Safety Case Part 1, as an output of the HazIDs. | Any mitigations, control measures or assumptions identified during the HazID are captured as Safety Requirements, such that they can be managed appropriately. |

Table 8 - Claim 2.1 Argument and Evidence

### 7.3.3 Claim 2.2 - Design

The submitted design for the RWY21 RNAV(GNSS) IAP is deemed acceptably safe and agreed by the CAA.

| Argument | Evidence | Rationale |
|---|---|---|
| The scope and purpose of the airspace change is accurately defined and consistent with the Operational Requirement. | Airspace Change Proposal, including the Design Options Appraisal, and also the IFP Formal Design Report. | The Airspace change is defined and functionally fit for purpose. |
| IAPs associated with the revised airspace arrangements have been designed by a UK CAA Approved Procedure Designer. | Osprey Consulting Services Limited (OCSL) has designed the new Biggin Hill Instrument Approach Procedures.<br>OCSL are UK CAA certified Approved Procedure Design Organisations. | The design has been developed by competent personnel in a structured manner and in accordance with relevant standards. |
| Requirements have been defined and endorsed to ensure Regulatory compliance | Evidence of Adherence to design criteria in PANS-OPS 8168 Volume II.<br>Acceptance of Safety Case. | Establishes baseline for subsequent Assurance that the Regulatory requirements have been met. |
| Where practicable, identified hazards have been eliminated. | Where possible through Design and Stakeholder Feedback, Designs have been developed to where possible remove or mitigate identified hazards.<br>Acceptance of Safety Case. | Elimination hazards through RWY21 RNAV(GNSS) IAP design and existing or planned mitigation |
| The design and implementation of the RWY 21 RNAV (GNSS) IAP satisfies all the derived Safety Objectives and Requirements. | Evidence of Adherence to relevant sections of CAP 1616 and CAP 1616f in Safety Case.<br>Acceptance of Safety Case. | Establishes baseline for subsequent Assurance that the Regulatory requirements have been met. |

Table 9 - Claim 2.2 Argument and Evidence

### 7.3.4 Claim 2.3 - Transition

The Programme for transitioning the RWY21 RNAV(GNSS) IAP into operational use is planned and acceptably safe.

| Argument | Evidence | Rationale |
|---|---|---|

| | | |
|---|---|---|
| Where practicable, identified hazards have been eliminated, or deemed acceptable and ALARP. | Transition risk assessment, as detailed in this document (Section 6.2) | Elimination/ minimisation of hazards through procedure design. |
| Appropriate control measures and mitigations are in place to support the introduction of the new procedures. | Transition risk assessment, as detailed in this document (Section 6.2)<br>All new/amended procedures to control and mitigate risk have been included in MATS Part 2. | Ensures preparedness of all impacted areas for the new procedure design. |
| Promulgation of the RWY21 RNAV(GNSS) IAP is achieved in a timely manner. | A suitable AIRAC Cycle will be identified following route design approval. LBHA will identify a suitable date after completing their Transition Plan. | Publication of the RWY21 RNAV(GNSS) IAP in an appropriate publications increases awareness across the Aviation community. |

Table 10 - Claim 2.3 Transition

### 7.3.5 Claim 2.4 – In Operation

The use of the RWY21 RNAV(GNSS) IAP will remain acceptably safe during use. This will be the subject of the Safety Case Part 4.

# 8 Conclusions and Recommendations

## 8.1 Safety of Design

It is concluded that the evidence set out in this SCR supports the claims that:

- The extant operation at LBHA is acceptably safe.
- The use of the RWY21 RNAV(GNSS) IAP at LBHA will be acceptable safe.

Compliance is demonstrated with the derived Safety Objectives that limit the level of risk associated with the hazards to an ACCEPTABLE level.

Additionally, compliance has been shown to all derived Safety Requirements that limit the likelihood or severity of the identified hazard risk to an ACCEPTABLE level. Some Safety Requirements are currently shown to be 'Conditionally Compliant' since the evidence of compliance is not available at the time of publication of this SCR. However, for these requirements a plan exists for this evidence to be generated when implementing the Biggin Hill IAPs.

## 8.2 Safety of Transition

This SCR has demonstrated that the process of introducing the LBHA IAPs into service has been assessed and is considered to be safe.

Some transitional Safety Requirements are currently shown to be 'Conditionally Compliant' since the evidence of compliance is not available at the time of publication of this SCR. However, for these requirements a plan exists for this evidence to be generated when implementing the LBHA IAPs.

## 8.3 Development of Safety Case

This SCR (Part 2 and 3) should be reviewed and updated prior to promulgations to ensure full compliance with all derived Safety Requirements is achieved. Any actions that are identified or required from the Transition Risk Assessment must be addressed.

A Part 4 SCR will be developed with the aim of satisfying the following claims made in the Safety Argument (Claim 2.4):

- The use of the RWY21 RNAV(GNSS) IAP will be utilised in a manner that is in accordance with its design and intended use.
- A management system is in place that objectively ensures that the basis of the safety assurance remains valid.

# A1 Table of Acronyms

| Acronym | Meaning |
|---|---|
| ACP | Airspace Change Proposal |
| AIP | Aeronautical Information Publication |
| AMS | Airspace Modernisation Strategy |
| ANSP | Air Navigation Service Provider |
| APV | Approach with Vertical Guidance |
| ATC | Air Traffic Control |
| ATM | Aerodrome Traffic Monitor |
| CAA | Civil Aviation Authority |
| CAP | Civil Aviation Publication |
| CAS | Controlled Airspace |
| ECAC | European Civil Aviation Conference |
| EU | European Union |
| GNSS | Global Navigation Satellite System |
| HAZ | Hazard |
| HAZID | Hazard Identification |
| IAP | Instrument Approach Procedures |
| ICAO | International Civil Aviation Organisation |
| IFP | Instrument Flight Procedure |
| IFR | Instrument Flight Rules |
| ILS | Instrument Landing System |
| LBHA | London Biggin Hill Airport |
| LNAV | IAP with Lateral Navigation |

| | |
|---|---|
| LPV | IAP with Vertical Guidance |
| MAP | Missed Approach Procedure |
| MATS | Manual of Air Traffic Services |
| MM | Management Manual |
| MOR | Mandatory Occurrence Reports |
| OCSL | Osprey Consulting Services Limited |
| RNAV | Area Navigation |
| RWY21 | Runway 21 |
| SAR | Search and Rescue |
| SARP | Standards and Recommended Practices |
| SCR | Safety Case Report |
| SES | Single European Sky |
| SIS | Signal In Space |
| STAR | Standard Arrival Route |
| UK | United Kingdom |
| VFR | Visual Flight Rules |

# A2 References

| Reference | Title | Origin |
|---|---|---|
| [Ref. 01] | LBHA, Safety Management System (SMS) Manual BHAL-MAN-009 v4 | LBHA |
| [Ref. 02] | LBHA Safety Case Part 1 (71372 014 - Issue 3 – 23rd Sept 2024) | Osprey |
| [Ref. 03] | CAP 1616: Airspace Change Process (4th Edition published March 21) | CAA |
| [Ref. 04] | CAP 670: Air Traffic Services Safety Requirements (3rd Issue, Amendment 1/2019, 1 June 2019, Effective 1 Aug 2019) | CAA |
| [Ref. 05] | LBHA Manual of Air Traffic Services (MATS) Part 2 (Edition 3.2 – March 2024) | LBHA |
| [Ref. 06] | CAP 493: Manual of Air Traffic Services (MATS) Part 1 (11th Edition, 28 Dec 23) | CAA |
| [Ref. 07] | CAP 785A: Oversight of UK Approved Procedure Design Organisations (2nd Edition version 3 published Sep 22) | CAA |
| [Ref. 08] | ICAO Document PANS-OPS 8168 (6th Edition, 2018) | ICAO |
| [Ref. 09] | CAP 785B: Implementation and Safeguarding of IFPs in the UK (2nd Edition version 2 published Sep 22) | CAA |
| [Ref. 10] | Biggin Hill RNP Rwy 21 IFP Design Report (72026 001 Issue 1) | Osprey |
| [Ref. 11] | ICAO Annex 10, Volume 1, Radio Navigation Aids (6th Edition, July 2006) | ICAO |
| [Ref. 12] | ACP Portal Link (ACP-2019-086) | CAA |
| [Ref. 13] | LBHA Aerodrome Manual (Revision 10 – 01/01/2024) | LBHA |
| [Ref. 14] | LBHA HazID Record (71372 013 – Issue 1 – 7th May 2021) | Osprey |
| [Ref. 15] | Meeting Notes (HazID 2) (71372 021 Issue 1 & 2 7th Feb 2022) | Osprey |
| [Ref. 16] | Meeting Notes (HazID 3) (71372 021 Issue 3 2nd Sep 2024) | Osprey |

# A3 Summary of CAA monitoring of GPS

The table below summarises data taken from the Global Positioning System (GPS) integrity & continuity reports published here:
https://www.caa.co.uk/data-and-analysis/airspace-and-environment/airspace/gps-reports/

| Date | Max Horizontal Accuracy (error, 95th percentile)[1] | Max Vertical Accuracy (error, 95th percentile)[2] | Integrity | Continuity | Avail |
|---|---|---|---|---|---|
| Q2 2024 | <6m | <7m | Met | 100% | 100% |
| Q1 2024 | <4m | <6m | Met | 100% | 100% |
| Q4 2023 | <6m | <7m | Met | 100% | 100% |
| Q3 2023 | <4m | <8m | Met | 100% | 100% |
| Q2 2023 | <4m | <5m | Met | 100% | 100% |
| Q1 2023 | <7m | <8m | Met | 100% | 100% |
| Q4 2022 | <4m | <5m | Met | 100% | 100% |

[1] Annex 10 Volume 1 Attachment D section 3.2.1 states: *"GNSS position error is the difference between the estimated position and the actual position. For an estimated position at a specific location, the probability should be at least 95 per cent that the position error is within the accuracy requirement."*

[2] Met the ICAO Annex 10 requirement since the horizontal and vertical errors are not close to the "Alert Limits". (For APV-I, horizontal alert limit is 40m, vertical alert limit is 50m)

| Date | Max Horizontal Accuracy (error, 95th percentile)[1] | Max Vertical Accuracy (error, 95th percentile)[2] | Integrity | Continuity | Avail |
|---|---|---|---|---|---|
| Q3 2022 | <3m | <5m | Met | 100% | 100% |
| Q2 2022 | <3m | <5m | Met | 100% | 100% |
| Q1 2022 | <3.5m | <13m | Met | 100% | 100% |
| Q4 2021 | <2.5m | <7.5m | Met | 100% | 100% |
| Q3 2021 | <2.5m | <4.0m | Met | 100% | 100% |
| Q2 2021 | <2.5m | <4.5m | Met | 100% | 100% |
| Q1 2021 | <3.0m | <4.5m | Met | 100% | 100% |
| Q4 2020 | <2.5m | <6.0m | Met | 100% | 100% |
| Q3 2020 | <2.5m | <4.0m | Met | 100% | 100% |
| Q2 2020 | <3.0m | <4.0m | Met | 100% | 100% |
| Q1 2020 | <2.5m | <4.0m | Met | 100% | 100% |
| Q4 2019 | <2.5m | <4.0m | Met | 99.9547% | 99.99818% |
| Q3 2019 | <3.0m | <5.0m | Met | 100% | 99.9934% |

| Date | Max Horizontal Accuracy (error, 95th percentile)[1] | Max Vertical Accuracy (error, 95th percentile)[2] | Integrity | Continuity | Avail |
|---|---|---|---|---|---|
| Q2 2019 | <2.5m | <5.0m | Met | 100% | 100% |
| Q1 2019 | <2.5m | <4.0m | Met | 100% | 100% |
| Q4 2018 | <3.0m | <4.5m | Met | 100% | 100% |
| Q3 2018 | <2.5m | <5.0m | Met | 100% | 100% |
| Q2 2018 | <3.0m | <5.0m | Met | 100% | 100% |
| Q1 2018 | <2.5m | <5.0m | Met | 100% | 100% |
| Q4 2017 | <2.5m | <5.0m | Met | 100% | 100% |
| Q3 2017 | <2.5m | <7.0m | Met | 100% | 100% |
| Q2 2017 | <2.5m | <7.5m | Met | 100% | 100% |
| Q1 2017 | <2.5m | <5.0m | Met | 100% | 100% |
| Q4 2016 | <3.0m | <5.5m | Met | 100% | 100% |
| Q3 2016 | <2.0m | <4.5m | Met | 100% | 100% |
| Q2 2016 | <2.5m | <7.0m | Met | 100% | 100% |

| Date | Max Horizontal Accuracy (error, 95th percentile)[1] | Max Vertical Accuracy (error, 95th percentile)[2] | Integrity | Continuity | Avail |
|---|---|---|---|---|---|
| Q1 2016 | <2.5m | <6.0m | Met | 100% | 100% |
| Q4 2015 | <3.0m | <9.0m | Met | 100% | 99.999% |
| Q3 2015 | <2.5m | <6.0m | Met | 100% | 100% |
| Q2 2015 | <3.0m | <8.0m | Met | 100% | 100% |
| Q1 2015 | <8.0m | <9.0m | Met | 100% | 100% |
| Q4 2014 | <3.0m | <12.0m | Met | 100% | 100% |
| Q3 2014 | <3.5m | <7.0m | Met | 100% | 100% |
| Q2 2014 | <3.5m | <7.0m | Met | 100% | 99.995% |
| Q1 2014 | <3.5m | <14.0m | Met | 100% | 100% |
| Q4 2013 | <4.0m | <14.0m | Met | 100% | 100% |
| Q3 2013 | <3.0m | <5.0m | Met | 100% | 100% |
| Q2 2013 | <3.5m | <7.0m | Met | 100% | 100% |

# A4 Compliance with Derived Safety Requirements

| No. | Safety Requirement Description | Compliance Status | Evidence |
|---|---|---|---|
| SR01 | The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to avoid flight into terrain or obstacles. | Compliant | As per section 4.3 (GNSS) of this document, and as laid out in the detailed data at Appendix A3 of this document. |
| SR02 | In the event of a loss of Comms, the Aircraft should follow Loss of Comms procedure as laid out in the AIP entry for LBHA | Compliant | As published in the LBHA MATS Part 2. |
| SR03 | LBHA ATC Voice Communications is compliant with the applicable requirements of CAP670, Air Traffic Services Safety Requirements | Compliant | As a certified aerodrome LBHA is already compliant with CAP 670 and the introduction of the new IAPs do not alter current compliance. |
| SR04 | LBHA shall have 2 x direct lines to Thames Radar | Compliant | As published in the LBHA MATS Part 2. |

| No. | Safety Requirement Description | Compliance Status | Evidence |
|---|---|---|---|
| SR05 | LBHA shall have Speed dials via voice switch to local ANSPs/agencies | Compliant | As published in the LBHA MATS Part 2. |
| SR06 | LBHA shall have an additional speed dial to Redhill | Compliant | As published in the LBHA MATS Part 2. |
| SR07 | LBHA shall have mobile phone numbers recorded in MATS Part 2 | Compliant | As published in the LBHA MATS Part 2. |
| SR08 | LBHA MATS Part 2 must cover the process to be followed if surveillance is lost | Compliant | As published in the LBHA MATS Part 2. |
| SR09 | LBHA Approach Control will provide a Procedural Service for LBHA IFR traffic | Compliant | As published in the LBHA MATS Part 2. |
| SR10 | LBHA will be able to use advanced ATM in accordance with Section 2, Chapter 1, para 21 of the MATS Part 1 | Compliant | The use of the ATM has been approved for use by the CAA in accordance with Section 2, Chapter 2, Paragraph 21.2 of the MATS Part 1. |
| SR11 | LBHA RWY21 RNAV(GNSS) IAP shall be designed with holding patterns. | Compliant | Final IAP chosen design has been designed with holding patterns, and these can be seen on the final design. |

| No. | Safety Requirement Description | Compliance Status | Evidence |
|---|---|---|---|
| SR12 | *Not used due to Hazard removal* | N/A | N/A |
| SR13 | *Not used due to Hazard removal* | N/A | N/A |
| SR14 | *Not used due to Hazard removal* | N/A | N/A |
| SR15 | *Not used due to Hazard removal* | N/A | N/A |
| SR16 | There shall be a speed limit for the RNAV to ILS procedure | Compliant | Final IAP chosen design has been designed with a speed limit in place for the RNAV to ILS, and these can be seen on the final design. |

# A5 Compliance with Transition Safety Requirements

| Ref | Safety Requirement Description | Compliance |
|---|---|---|
| Tr_SR01 | | |
| Tr_SR02 | | |
| Tr_SR03 | | |
| Tr_SR04 | | |
| Tr_SR05 | | |
| Tr_SR06 | | |
| Tr_SR07 | | |

# A6 Transition Risk Assessment

The level of tolerability and the risk assessment criteria are set out in the LBHA SMS, which considers the risk of an unwanted event as a combination of the likelihood of occurrence and the potential severity of the consequence(s).

The calculated level of risk will be categorised as acceptable, review and undesirable and unacceptable, as described in the LBHA SMS Manual. A description of these categories is given below.

- ACCEPTABLE (Low) –Risk is considered acceptable but should be reviewed if it reoccurs or changes that affect the risk are made.
- REVIEW (Moderate) – The level of risk is of concern and mitigation measures are required to reduce the level of risk to as low as reasonably practicable. Where further risk reduction/mitigation is not practical or viable, the risk may be accepted, provided that the risk is understood and has the endorsement of the person signing it off. Accountable Manager or Head of Department (HoATS, HoSC) Fire Service Manager, Head of Airport Operations, Head of Terminal Operations, CFO).
- UNDESIRABLE (High): - The risk is undesirable and major mitigation measures are required to reduce the level of risk to as low as reasonably practicable. Undesirable risks may be approved by the Accountable Manager for one-off activities but this is not envisaged for long term activities.
- UNACCEPATBLE: - The risk is unacceptable and will be terminated, treated (mitigated to an acceptable level) or transferred (to another organisation). Do not continue with this activity or go ahead with the proposed change. All actions assigned during this risk assessment will not be activated.

| Ref | Phase | Activity | Hazard/s | Consequences | Mitigation | Severity | Likelihood | Risk (Mitigated) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |

| Ref | Phase | Activity | Hazard/s | Consequences | Mitigation | Severity | Likelihood | Risk (Mitigated) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |