

CAP1781 Compliance Report

Farnborough Airport

Withdrawal of the OCK DVOR

Issue 2

Action	Role	Name	Signature	Date
Responsible	Subject Matter Expert (Farnborough Airspace)	[REDACTED]	Not Required	
Agree	General Manager Farnborough Airport	[REDACTED]	Signatures are recorded via e-mail.	
Agree	Manager Operations and Training Farnborough Airport	[REDACTED]		
Approve	Project Manager (Commercial)	[REDACTED]		
Approve	Farnborough Airport - Airfield Operations Director	[REDACTED]		

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Executive Summary

Background

This CAP Compliance Report supports Farnborough Airport Ltd application to utilise RNAV substitution for the RT Failure procedures (also referred to as Initial Approach Procedures) for the following IAPs at Farnborough: -

- ILS/DME RWY 06
- LOCDME RWY 06
- SRA RWY 06
- ILS/DME Y RWY 24
- ILS/DME Z RWY 24
- LOC/DME Y RWY 24
- LOC/DME Z RWY 24
- SRA Y RWY 24
- SRA Z RWY 24

Further, the missed approach procedures applicable are the

- ILS/DME Y and
- LOC/DME Y RWY 24 references the OCK DVOR and would also be subject to RNAV Substitution.

This is to be achieved through the interim measure of Flight Management System (FMS) coding by demonstrating compliance to CAP1781 [1].

It is confirmed that the tracks shown on the charts do not change the “over-the-ground” routeing after applying the process of the RNAV substitution.

Currently CAP1781 only refers to the use of RNAV1 equipage. Farnborough Airport wishes to include RNAV5 equipage as part of this Compliance Report as some airport traffic is RNAV5 standard and the RCF procedures for these are currently predicated on the OCK DVOR. This was discussed during the Assessment meeting held on 21st April 2023 and providing a robust safety argument can be made the CAA has agreed with this course of action.

The NATS En-Route Limited (NERL) sponsored DVOR/NDB/DME Rationalisation Programme is withdrawing 27 Doppler Very High Frequency Omni Range (DVORs) from operational service. As each of the 27 DVORs are removed, the airport owned procedures such as Instrument Approach Procedures (IAPs) that rely upon or reference the DVORs due for withdrawal will no longer be valid. The OCK DVOR is one of the DVORs included in this reduction plan and, despite a previous extension to operation, is scheduled to be decommissioned on 31st December 2023.

Farnborough Airport

Farnborough Airport Ltd have a total of 14 procedures and publications that either rely upon or refer to the OCK DVOR as conventional navaid. Of these, the 9 listed above are operationally required to ensure suitable procedures exist for aircraft unable to communicate with ATC, albeit the expectation is that system reliability and redundancy means these would be used in extremely rare emergency situations.

The remaining 5 references to OCK DVOR

- EGLF 5-1 : ATC SMAC,
- EGLF 4-2 : Control Zone and Control Area Chart
- EGLF 2.19 : Radio navigation Aids
- EGLF 2.22 : Flight procedures
- ENR 6-83 : Farnborough CTR & CTA Chart

are textual and/or administrative within the UK AIP.

As part of FASI(S) Farnborough Airport is progressing a future ACP which will review all procedures for acceptability against new proposed airspace structures and make changes as required. Due to the previous Airspace Change Proposal for Farnborough Controlled Airspace remaining in post implementation review stage for an extended period (due to the COVID-19 pandemic), any work on the FASI(S) ACP will extend beyond the scheduled 31st December 2023 withdrawal date for the OCK DVOR, which has led to a misalignment in timescales that could leave Farnborough Airport without the required procedure sets and jeopardise operations.

An Impact Assessment conducted by Farnborough Airport Ltd [2] to assess the effect of the OCK DVOR withdrawal concluded that the most efficient option, both in terms of operational implementation and cost, would be to apply for approval to use the CAA's guidance CAP1781 to utilise RNAV substitution for the procedures above, whilst not a permanent solution, would allow operators to have continued access to these procedures without the ground-based asset.

The inclusion of RNAV5 equipage, alongside the current CAP1781 approved RNAV1 equipage, is required.

The information presented within this CAP Compliance Report forms part of the Approval Documentation Pack required by CAP1781b [3] to provide the following:

Safety Argument

The Safety Argument for Farnborough Airport's RNAV Substitution is in the form of a goal-structuring notation (GSN) argument. The top-level goal is:

- "The use of DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781) to mitigate the OCK DVOR removal for the IAPs at Farnborough Airport is acceptably safe".

Safety Review

It should be noted that this safety document incorporates both V1 and V2 versions of the Safety Review (within this compliance document), which demonstrates that the evidential items supporting the Safety Argument's sub-goals have been sufficiently met. Safety Review V1 and V2 will not be issued separated. CAA have agreed with this approach.

Safety Analysis

The safety assessment workshops (APSAs [20] and [21]) concluded that the RNAV Substitution change only resulted in Risk Class D levels and it is therefore acceptably safe to implement this change.

- RNAV1 Aircraft RTF Workshop found no additional hazards associated with the RNAV1 substitution.
- RNAV5 Aircraft RTF Workshop found 3 hazards associated with the inclusion of RNAV5 aircraft.
 - Aircraft Does Not Follow the Initial Approach.
 - Partway through the Approach Procedure the Aircraft Flies an unexpected Route.
 - Proximity of Proposed Procedure to other airspace volumes.
 -

General Status of Safety Requirements and GSN Requirements

The general status of the Safety Requirements is at Table 1 and GSN Requirements is shown at Table 2.

Detailed status of the Safety Requirement is in APPENDIX B.

Id	Description	Status	Comment
SR2-1	Farnborough Airport Impact Assessment [2]	MET Complete	
SR3-1	NATS Lead Operator Technical Group Meeting Minutes [6]	MET Complete	

Id	Description	Status	Comment
SR3-2	Farnborough MATS Pt 2 [4] (information contained in the ATC SI [23]. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]).	MET Complete	
SR3-3	Inclusion of RNAV5	Conditionally MET	Conditionally Met subject to CAA approval for the inclusion of RNAV5
SR4	N/A	N/A	N/A
SR5-1	GM ATC Farnborough Advisory RNAV email to INEOS [10]	MET Complete	
SR5-2	GM ATC Farnborough Advisory RNAV email to Acropolis Centreline [14]	MET Complete	
SR5-3	GM ATC Farnborough Advisory RNAV email to BAe Systems Warton [24]	MET Complete	
SR5-4	GM ATC Farnborough Advisory RNAV email to NetJets [29]	MET Complete	
SR5-5	GM ATC Farnborough Advisory RNAV email to VistaJet [30]	MET Complete	
SR5-6	GM ATC Farnborough Advisory RNAV email to Flexjet[32]	MET Complete	
SR5-7	Engagement evidence confirmation email from INEOS [11]	MET Complete	
SR5-8	Engagement evidence confirmation email from Acropolis Centreline [18]	MET Complete	
SR5-9	Engagement evidence confirmation email from BAe Systems Warton [27]	MET Complete	
SR5-10	Engagement evidence confirmation email from NetJets [29]	MET Complete	
SR5-11	Engagement evidence confirmation email from VistaJet [30]	MET Complete	
SR5-12	Engagement evidence confirmation email from Flexjet[31]	MET Complete	
SR6-1	DMD/DME Coverage Plots Current and proposed [section 5]	MET Complete	
SR7-1	RTF Track Data [section 7] Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]	MET Complete	
SR8-1	Stakeholder Engagement: GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club (GA)[13]	MET Complete	
SR8-2	Farnborough Aero Club Response: GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]	MET Complete	
SR10.1	Email showing CAP1781 acceptance by CAA that sponsors do not have to check individual coding solutions regarding ineligible leg types. [9]	Conditionally MET	Conditionally Met subject to the CAA agreeing to the Email explanation [12] provided
SR12.1	AIP Updates Farnborough Airport APPENDIX C showing intended updates. Also [21][13]	MET Complete	

Id	Description	Status	Comment
SR14.1	Additional text that Farnborough will add to the AD Section of the AIP, Figure 11 in APPENDIX C. Also email [13]	MET Complete	
SR15.1	Confirmation regarding NOTAM requirement and the coordinated approach between Farnborough and NERL [13] [26]	MET Complete	
SR16.1	Email confirmation regarding ATIS transmission requirements [13]	MET Complete	
SR17.1	CAA agreement that Farnborough Airport are not routinely able to provide track-over-the-ground data is required to meet this SR.	Conditionally MET	Conditionally Met subject to CAA agreement that there is no track data available
SR18.1	CAA approval that CAP1781 can be implemented by Farnborough Airport [9]	MET Complete	

Table 1 - General Status of Safety Requirements

Detailed status of the GSN Requirements is in APPENDIX A.

Goal 1 DVOR/DME/NDB Rationalisation – OCK DVOR removal at Farnborough Airport is acceptably safe.			
Id	Description	Status	Comment
E2-1	Safety Review (this document)	MET Complete	
E2.2	DME / DME Coverage [8]	MET Complete	
E2.3	Inclusion of RNAV5	Conditionally MET	Conditionally Met subject to CAA approval for the inclusion of RNAV5.
E3.1	Safety Review (this document)	MET Complete	
E3.2	Inclusion of RNAV5	Conditionally MET	Conditionally Met subject to CAA approval for the inclusion of RNAV5.
E4-1	Farnborough Airport Impact Assessment [2]	MET Complete	
E5-1	Safety Review (this document)	MET Complete	
E5-2	CAA Approval [9]	MET Complete	
E5-3	Coding Houses DQR – Activation	Conditionally MET	Conditionally Met subject to CAA action approval and confirmation of Coding House DQR by the CAA.
E6-1	AIP Updates [Appendix C] showing intended updates[21] [13]	MET Complete	
E6-2	ATC Local flight procedure updates [13][21]	MET Complete	
E6-3	NOTAM and ATIS updates regarding the OCK withdrawal. [13]	MET Complete	
E6-4	GA (Farnborough Aero Club) Informed [13]	MET Complete	
E6-5	Coding houses notification	Conditionally MET	Conditionally Met subject to CAA action (CAA notification to the Coding Houses).
E7-1	Performance Monitoring Plan [13]	MET Complete	
E7-2	Baseline Track over the ground analysis [13]	MET Complete	
E8-1	Unit Safety Case Updates [19]	MET Complete	

Goal 1 DVOR/DME/NDB Rationalisation – OCK DVOR removal at Farnborough Airport is acceptably safe.			
Id	Description	Status	Comment
E8-2	Safety Review (this document)	MET Complete	
E8-3	MATS Pt 2 Updates [13][21]	MET Complete	

Table 2 – General Status of GSN Requirements

DME Coverage

The DME performance coverage and redundancy analysis was obtained from NERL [8]. The DME coverage plots for the current DME/DME infrastructure depict a high coverage and redundancy provision to the Farnborough CTA at 2,000ft, 3,500ft and 6,000ft AMSL; therefore, DME coverage is sufficient to support RNAV1 in the event of GNSS unavailability.

Baseline Track Over the Ground Performance Data

System serviceability and redundancy means that operationally the elements being proposed for RNAV substitution are not flown unless such aircraft are in an emergency situation. Given this, it is not possible to provide over the ground performance data for these procedures. Should an event occur resulting in an aircraft flying the procedure it will be radar monitored by the Farnborough Radar Controller and records kept of the actual track flown will be available through both radar recording and the airport local track keeping 'ANOMS' system. Any recorded RCF aircraft will be reported via the NATS STAR tool and formal MOR process.

NATS STAR incident recording data at Farnborough indicates that there have been zero aircraft RT failure events recorded as using these procedures in the last 10 years [15]

CO₂ Environmental Analysis Impact

As this application is for RNAV substitution using FMS overlays for the Initial Approach Procedures for Farnborough Airport, together with certain missed approaches, there will be no change to the lateral or vertical tracks of each procedure, or any change that will impact adjacent IFPs. Therefore, as this proposal will not impact distance flown or vertical profile, therefore there will be no change in fuel, CO₂, or greenhouse gas emissions as a result of applying CAP1781.

Conclusion

In order for this report to conclude that Farnborough Airport Ltd has provided the evidence and the documentation required to meet the approval for the Farnborough RNAV Substitution (CAP1781) the following actions must be addressed:

1. Gaining CAA approval and agreement as shown in Tables 1 and 2.
2. Providing evidence that airport operators have been informed of the RNAV substitution and those that have not responded, CAA approval that the FLOPSC and Lead Operator Minutes are acceptable.

Table of Contents

Executive Summary 3

Publication History	8
Reviewers	9
Document Use	9

Acronyms and Abbreviations 9

References	9
------------	---

1 Introduction 10

1.1	Purpose	10
1.2	Objective	10
1.3	Document Scope	11

2 Background Information 11

2.1	DVOR/NDB/DME Rationalisation	11
2.2	CAP1781 Guidance	12
2.3	Farnborough Airport Ltd	12
2.4	Justification for the Inclusion of RNAV5	13

3 Safety Argument Farnborough Airport RNAV Substitution 13

3.1	Safety Argument Overview	14
3.2	Farnborough Airport Goal Structure Notation	15
3.3	Goal 1 (top goal)	16

4 Safety Review 19

4.1	Safety Requirements	19
4.2	Safety Assessments	25
4.3	Assumptions	37
4.4	Limitations	37
4.5	Shortcomings	37
4.6	Alternative Mitigation	37

5 DME Coverage 38

5.1	DME Coverage at Farnborough CTR/CTAs	39
5.2	Data Coverage Conclusion	40

6 CO₂ Environmental Analysis Impact 40

7 Baseline Track Over the Ground Performance Data 40

8 Conclusion 41

APPENDIX A Farnborough Airport GSN Safety Argument – Status of Evidence Items 42

APPENDIX B CAP1781 – Detailed Status of Safety Requirements 45

APPENDIX C - Farnborough Airport Proposed AIP Updates 50

APPENDIX D - Acronyms and Abbreviations 50

APPENDIX E - References 52

Publication History

Issue	Month/Year	Change Requests and summary	Safety impact
Draft	August 2023	Draft for review	N/A
Issue 1	August 2023	Submission to CAA	N/A

Reviewers

No additional reviewers over and above the signatories listed above.

Document Use

External use: Yes (Farnborough Airport Ltd)
(CAA)

Acronyms and Abbreviations

Translations are embedded in the text where the first usage appears. A full list of acronyms and abbreviations can be found in [APPENDIX D](#)

References

Please see [APPENDIX E](#)

1 Introduction

1.1 Purpose

This CAP Compliance Report supports Farnborough Airport Ltd application to utilise RNAV substitution for the RT Failure procedures (also referred to as Initial Approach Procedures) for the following IAPs at Farnborough: -

- ILS/DME RWY 06
- LOCDME RWY 06
- SRA RWY 06
- ILS/DME Y RWY 24
- ILS/DME Z RWY 24
- LOC/DME Y RWY 24
- LOC/DME Z RWY 24
- SRA Y RWY 24
- SRA Z RWY 24

Further, the missed approach procedure applicable to the ILS/DME and LOC/DME Y RWY 24 references the OCK DVOR and would also be subject to RNAV Substitution.

This is to be achieved through the interim measure of Flight Management System (FMS) coding by demonstrating compliance to CAP1781 [1].

The information presented within this report should be read in conjunction with the Impact Assessment produced by Farnborough Airport [15], as together they form the Approval Documentation Pack required by CAP1781b [3].

1.2 Objective

The objective of this document will provide the specific activities and evidence that will:

- Provide an overview of the Safety Argument
- Confirm that the Safety Requirements are satisfied in the combined Safety Review (this document)
- State how potential safety issues associated with the use of the Guidance on each procedure has been considered and detail any required mitigations (e.g., fallback procedures) to manage those issues
- State any Assumptions, Limitations and Shortcomings
- Demonstrate sufficient DME/DME coverage at levels relevant to the procedures
- Investigation into recorded use of Farnborough RT fail procedures by aircraft in an emergency.
 - Note: Investigation of the STAR database has shown that there have not been any aircraft RT failure incidents at Farnborough in the last 10 years [15].
- Confirm that the argument and activities conducted comply with the CAP1781

1.3 Document Scope

This CAP1781 Compliance Report contains the Safety Argument, Safety Review, DME/DME coverage, and RT failure usage evidence that is required as part of the Civil Aviation Authority's (CAA) Approval Documentation Pack. It demonstrates that the GSN evidential items [3.2] supporting the Safety Argument's sub-goals have been sufficiently met. The CAA have agreed that this compliance report can be issued as a single document. The CAP1781 would normally require Version 1 and Version 2 to be issued.

Figure 1 shows the relationship between this Compliance Report document (single issue version) and the Impact Assessment produced by Farnborough Airport [2].

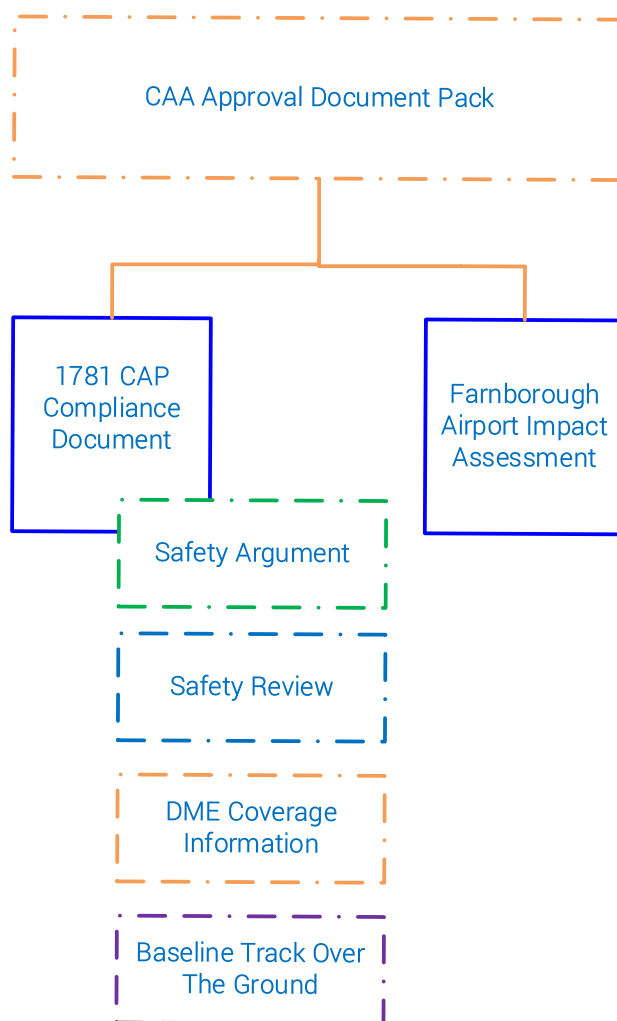


Figure 1- CAP1781 Document Structure (Single-Issue Compliance Document)

2 Background Information

2.1 DVOR/NDB/DME Rationalisation

The NATS En-Route Limited (NERL) sponsored DVOR/NDB/DME Rationalisation Programme was established in 2008, as part of the UK's Airspace Modernisation Strategy (AMS) to increase satellite navigation technology and phase out the routine use of ground-based radio navigation aids (navaids). Since Programme launch, this initiative has now removed all UK en-route Non-Directional Beacons (NDBs) and will reduce the UK Doppler Very High Frequency Omni Range (DVOR) network from 46 to 19 by removing 27 DVORs from operational service by December 2022. The Distance Measuring Equipment (DME) facilities will be optimised for geometry and coverage.

The NATS En-route Instrument Flight Procedures (IFPs) that were predicated on the 27 DVORs due for removal such as Standard Arrival Routes (STARs) and Holds have now been removed or replaced with RNAV procedures. However, as each of the 27 DVORs due for removal are decommissioned, the airport-owned procedures such as SIDs that rely upon or reference the DVORs due for withdrawal, will no longer be valid.

In 2018 a formal notice was issued by NATS to all airports impacted by DVOR Rationalisation to remove their airport dependencies from those DVORs due for removal by 31st December 2022. However, following the Covid-19 pandemic many airports' airspace change programmes to initiate the work required to remove their airport dependencies have been delayed, whereas the timeline for the NERL DVOR rationalisation programme has remained unchanged.

2.2 CAP1781 Guidance

The CAA guidance for the Use of RNAV Substitution CAP1781 [1] was produced to support the AMS and may be applicable to certain sponsors¹ whose IFPs are based on those conventional nav aids due to be withdrawn through the NATS DVOR/NDB/DME Rationalisation Programme or that need to be permanently removed/decommissioned for reasons beyond the control of the affected aerodrome. However, it should be noted that this guidance is not an alternative to either deleting or replacing procedures but subject to specific conditions, the application of CAP1781 to utilise RNAV substitution through FMS coding can provide an interim measure. As such, to gain approval to apply CAP1781, owners of procedures that are dependent on a nav aid which is to be withdrawn must undertake several activities that can demonstrate that using the CAP1781 guidance as an interim measure is acceptably safe.

2.3 Farnborough Airport Ltd

The OCK VOR was due to be withdrawn on 31st December 2022, however an extension to its operational service was agreed and is now to be withdrawn on 31st December 2023. There is no possibility of further extension to service life.

Farnborough Airport Ltd have a total of 14 procedures and publications that either rely upon or refer to the OCK DVOR as conventional nav aid (Table 1). Of these, the 9 listed below are operationally required to ensure suitable procedures exist for aircraft unable to communicate with ATC, albeit the expectation is that system reliability and redundancy means these would be used in extremely rare emergency situations.

	VEXUB VOR/DME Hold	RCF PEPIS to VEXUB	RCF VEXUB to ILS/LOC 06	RCF VEXUB to ILS/LOC 24	Missed Approach
AD 2-EGLF-8-1 ILS/DME 06	X	X	X	-	-
AD 2-EGLF-8-2 LOC/DME 06	X	X	X	-	-
AD 2-EGLF-8-3 SRA 06	X	-	X	-	-
AD 2-EGLF-8-4 ILS/DME Y 24	X	X	-	X	X
AD 2-EGLF-8-5 ILS/DME Z 24	X	X	-	X	-
AD 2-EGLF-8-6 LOC/DME Y 24	X	X	-	X	X
AD 2-EGLF-8-7 LOC/DME Z 24	X	X	-	X	-
AD 2-EGLF-8-8 SRA Y 24	X	-	-	X	-
AD 2-EGLF-8-9 SRA Z 24	X	-	-	X	-

Table 3 – Farnborough RNAV Substitution Procedure Changes

As part of FASI(S) Farnborough Airport is progressing a future ACP which will review all procedures for acceptability against new proposed airspace structures and make changes as required. Due to the previous Airspace Change Proposal for Farnborough Controlled Airspace remaining in post implementation review stage for an extended period due to the COVID-19 pandemic, any work on the FASI(S) ACP will extend beyond the scheduled 31st December 2023 withdrawal date for the OCK DVOR, which has led to a misalignment in timescales that could leave Farnborough Airport without the required procedure sets and jeopardise operations.

An Impact Assessment, conducted by NATS [2] to assess the effect of the OCK DVOR withdrawal, concluded that the most efficient option, both in terms of operational implementation and cost, would be to apply for approval to use the CAA's guidance CAP1781 to utilise RNAV substitution for the procedures above, which, whilst not a permanent solution, would allow airlines to continue to fly these procedures without the ground-based asset.

2.4 Justification for the Inclusion of RNAV5

Currently CAP1781 only refers to the use of RNAV1 equipage. Farnborough Airport wishes to include RNAV5 equipage as part of this Compliance Report, as some airport traffic is RNAV5 standard and the RCF procedures for these are currently predicated on the OCK DVOR. This was discussed during the Assessment meeting and provided a robust safety argument can be made the CAA has agreed with this course of action.

The argument below justifies the inclusion of RNAV5 by describing the procedures Farnborough Airport will adopt for an RNAV5 aircraft RCF:

- Aircraft operating into Farnborough and the Wessex group of airfields that do not meet the equipment standards necessary to operate to RNAV1 standard are known to ATC by means of the STAR associated with their flight (NAS processed) and flight progress strip highlighting (Electronic Flight Progress Strip conditional formatting of the route colour).
- Such aircraft have specific ATC handling procedures, which already have an element of Radar monitoring of aircraft track compliance built in.
- The unit carried out a SP406 APSA, (specific to inclusion of RNAV5 aircraft within the RNAV substitution (reference APSA LF/16/23) examined the hazards associated with such inclusion and only identified class D risks. Mitigations proposed as part of that APSA were: -
 - Generation of a unit SI requiring controllers provide a clear path of airspace ahead of any RT failure detected RNAV5 aircraft, including requests for group airfields to suspend departures due to emergency traffic. This is already what ATC would do for any aircraft squawking 7600 that had been inbound to Farnborough or group airfields.
 - Unit Manager to ensure local fleet operators are aware of the FMS derived changes to the procedures enabling RNAV substitution and the RNAV substitution itself. This is already one of the Safety requirements of the compliance report. Include references as necessary.
 - Unit SI to include reference that any RT failure to be handled with caution, with an expectation that the track flown could be either one applicable to RNAV1 or RNAV5.
- Given the expectation that these procedures will almost never be flown and the fact that non RNAV1 aircraft are not a regular feature of the Farnborough operation, the unit requests that the CAA include non RNAV1 aircraft within the RNAV Substitution permission.

3 Safety Argument Farnborough Airport RNAV Substitution

3.1 Safety Argument Overview

This section presents the Safety Argument for Farnborough Airport's RNAV Substitution is based on the Goal Structuring Notation (GSN) argument structure in CAP1781b [3]. A GSN argument is a graphical notation that provides an illustration of how evidence items support sub-goals, which in turn support the claim that the top-level goal (G1) "The use of DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781) to mitigate the OCK DVOR removal for the IAPs at Farnborough Airport is acceptably safe".

To achieve this, sub goals G2-G8 need to be shown to be met by addressing a series of evidence items (Eis) which, if available without any unacceptable limitations or shortcomings should be sufficient to claim that the sub goal is met.

Section 3.2 depicts the goal structure for Farnborough Airport. Section [3.3](#) presents a summary of the top-goal and each sub-goal. Details and status of evidence items for each sub-goal are contained within [APPENDIX A](#).

It should be noted that this safety document covers both V1 and V2 versions of the Safety Review, which will demonstrate that the evidential items supporting the Safety Argument's sub-goals have been sufficiently met. Safety Review V1 and V2 will now not be issued separated. CAA have agreed with this approach.

3.2 Farnborough Airport Goal Structuring Notation

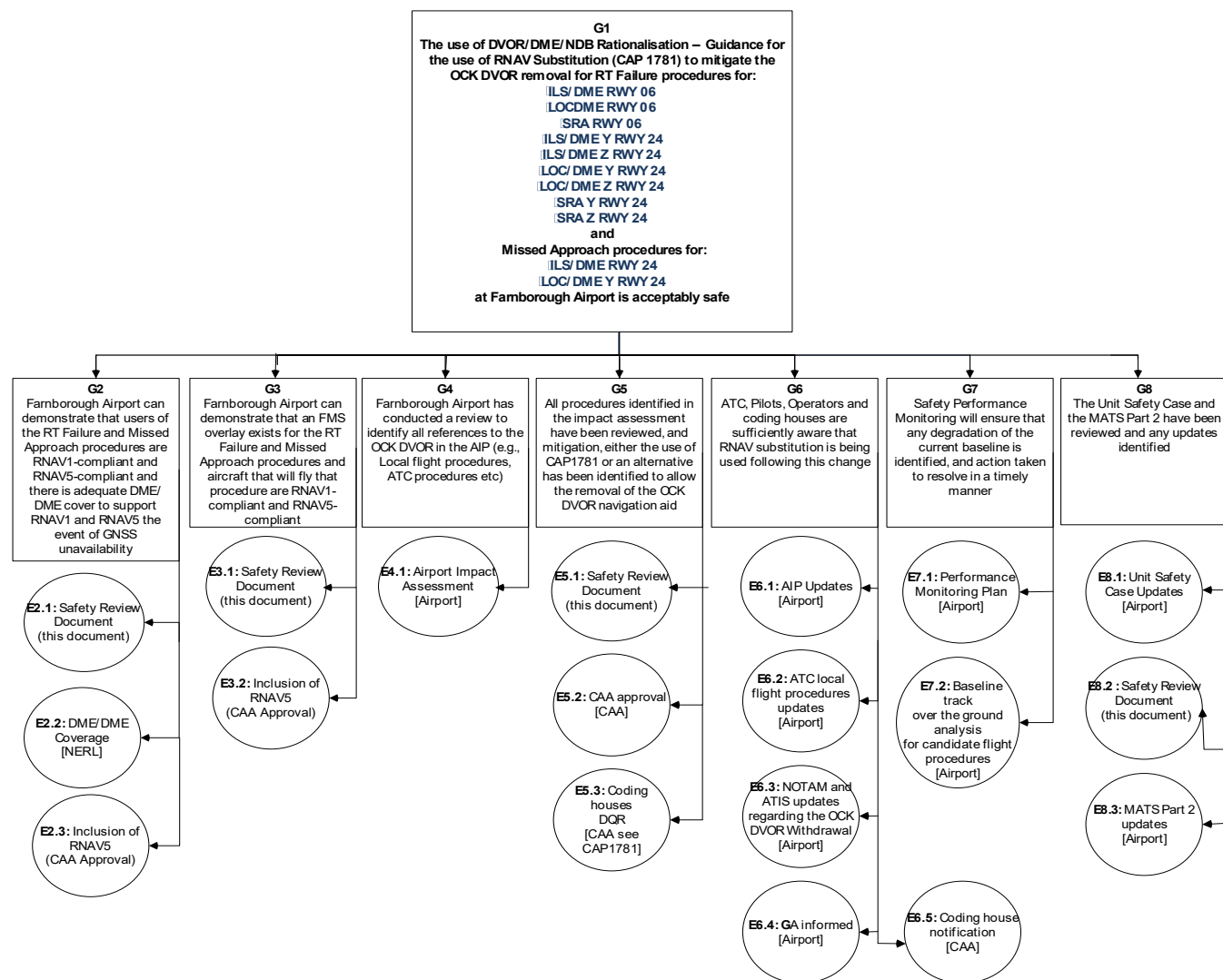


Figure 2 -Farnborough Goal Structuring Notation

3.3 Goal 1 (top goal)

Goal 1 presents the argument that the use of DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781) to mitigate the OCK DVOR removal for the IAPs at Farnborough Airport is acceptably safe. This is supported by the 7 specific sub-goals below.

3.3.1 Sub-Goal 2

Sub-goal 2 argues that the users of the OCK RT Fail and Missed Approach procedures at Farnborough Airport are suitably RNAV1 and RNAV5 equipped and that there is adequate DME/DME cover to support RNAV1 and RNAV5 in the event of GNSS unavailability.

Sub-goal 2 is supported by evidence items:

1. E2.1 – Safety Review (this document) - **Met**
2. E2.2 – DME / DME Coverage [8] - **Met**
3. E2.3 – Inclusion of RNAV5 2.4 – **Conditionally Met subject to CAA approval for the inclusion of RNAV5.**
In APPENDIX A

Sub-goal 2 is **Conditionally Met.**

3.3.2 Sub-Goal 3

Sub-goal 3 argues that the FMS overlays already exist for the RT Fail and Missed Approach procedures. Even though these procedures are rarely flown, aircrews are familiar with these procedures and the aircraft are RNAV1 and RNAV5 compliant and therefore are well able to use the overlays to fly the OCK procedures independent of the OCK DVOR. The removal of OCK navaid will have little effect as the majority of aircraft will continue to fly exactly as they would if the OCK DVOR were still in place.

Sub-goal 3 is supported by evidence items:

1. E3.1 – Safety Review (this document) - **Met**
2. E3.2 – Inclusion of RNAV5 2.4 – **Conditionally Met subject to CAA approval for the inclusion of RNAV5.** in APPENDIX A

Sub-goal 3 is **Conditionally Met.**

3.3.3 Sub-Goal 4

Sub-goal 4 provides the assurance argument that Farnborough Airport has conducted a review of the UK Aeronautical Information Publication (AIP) to identify all references to the OCK DVOR by conducting an Impact Assessment [2] in accordance with CAP1781b [3]. This assessment demonstrated that its review also extended into the textual part of the AIP and not solely the flight procedure plates, and confirmed that all local flight procedures, in addition to ATC procedures were considered.

Sub-goal 4 is supported by evidence item:

1. E4.1 – Farnborough Airport Impact Assessment [2] – **Met**
in APPENDIX A

Sub-goal 4 is **Met**

3.3.4 Sub-Goal 5

Sub-goal 5 argues that Farnborough Airport's procedures have been reviewed and mitigation options, either the use of CAP178 [1] or an alternative such as the provision of a tactical service by ATC or the redefinition of the procedures on an alternative navaid, have been considered.

Sub-goal 5 is supported by evidence items:

1. E5.1 – Safety Review (this document) - **Met**
2. E5.2 – CAA Approval [9] - **Met**
3. E5.3 – Coding Houses DQR – Activation – **Conditionally Met subject to CAA action (approval and confirmation of Coding House DQR by the CAA).**

In APPENDIX A

Sub-goal 5 is Conditionally Met.

3.3.5 Sub-Goal 6

Sub-goal 6 presents the argument that Farnborough Airport has correctly planned for RNAV Substitution by providing the evidence that all impacted stakeholders and parties have been engaged, and sufficient engagement arrangements are in place.

Sub-goal 6 is supported by evidence items:

1. E6.1 – AIP Updates [Appendix C (locally updated diagrams)] and CAA Chart Approval Email [17] – **Met.**
2. E6.2 – ATC Local flight procedure updates (MATS Pt 2 [4] and ATC [23]. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]) – **Met**
3. E6.3 – NOTAM and ATIS updates regarding the OCK withdrawal – Information provided in the TOI [26] Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]. **Met.**
4. E6.4 – GA Informed [13] – **Met.**
5. E6.5 – Coding houses notification – **Conditionally Met subject to CAA action (CAA notification to the Coding Houses).**

In APPENDIX A

For readability, the proposed AIP Updates for Farnborough Airport have been included in APPENDIX C

Sub-goal 6 is Conditionally Met.

3.3.6 Sub-Goal 7

Sub-goal 7 provides the assurance that the Safety Performance Monitoring activities such as a Performance Monitoring Plan and Baseline Track over the ground analysis have been conducted and that any degradation of the current baseline is identified, and action has been taken to resolve this in a timely manner.

The RT Fail and Missed Approach procedures have never been used (STAR Data Investigation [15]) and therefore assessing that track-over-the-ground is being correctly adhered is not possible. Nevertheless, should the procedures ever be flown, tracks will be closely radar monitored and recorded appropriately via MOR and STAR. This is considered sufficient to close E7.2.

With respect to the Performance Monitoring Plan, the ATC SI [23] instructs controllers to record any RT fail events via STAR and Record and Replay of track over ground. This is considered sufficient to close E7.1.

Sub-goal 7 is supported by evidence items:

1. E7.1 – Performance Monitoring Plan. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13] - **Met**.
2. E7.2 – Baseline Track Over The Ground Analysis. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13] – **Met**.

In APPENDIX A

Sub-goal 7 is **Met.**

3.3.7 Sub-Goal 8

Sub-goal 8 presents the assurance that Safety Review V2 – Implementation Stage updates Safety Review V1 by completing this Safety argument and that the Unit Safety Case and the MATS Part 2 have been reviewed and any updates identified.

Sub-goal 8 is supported by evidence items:

1. E8.1 – Unit Safety Case Updates [19] **Met**.
2. E8.2 – Safety Review (this document) **Met**
3. E8.3 – MATS Pt 2 Updates [4] (detailed in the ATC SI [23]. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]) – **Met**.

In APPENDIX A

Sub-goal 8 is **Met.**

4 Safety Review

The Safety Review forms part of a set of reports required by the CAA to apply to use CAP1781 RNAV Substitution (see section 1.3). Its purpose is to provide the following:

- Evidence to demonstrate compliance to SRs 2 to 8, 10, 12, and 14 to 17.
- Describe how potential safety issues associated with the use of the CAP1781 [1] have been considered, along with the details of the required mitigations (e.g., fallback procedures) to manage those issues
- Details of any assumptions, limitations, and shortcomings

And, for each procedure in the Impact Assessment [2] where alternative mitigation has been provided, Safety Review will provide:

- Details of the proposed mitigation.
- Rationale with supporting evidence as to why the mitigation is acceptably safe.
- Its impact on operators and General Aviation (GA).
- How this impact will be managed.

4.1 Safety Requirements

As explained in CAP1781b [3] SRs 2 to 8, 10, 12, and 14 to 17 are the responsibility of the applicant (Farnborough Airport Ltd), which when met will deliver a set of evidence items which will be used to substantiate the Safety Argument presented in [section 3](#).

Sections [4.1.1](#) to [4.1.8](#) present SRs 2 to 8, 10, 12, and 14 to 17 with a summary of how Farnborough Airport will demonstrate compliance. The details and status of evidence items for each SR are contained within [APPENDIX B](#).

It should be noted that:

- SRs 1, 9, 11 and 13 are the responsibility of the CAA and are **not** summarised in sections [4.1.1](#) to [4.1.8](#).
- Evidence of compliance to SR 2 to SR 8, SR 10 and SRs 12, 14, to 16 must be provided by Farnborough Airport *prior* to implementation within this Safety Review (see Figure 1).
- Evidence of compliance to requirement SR 17 is required post implementation with a time scale to be agreed with the sponsor and the regulator. See Note in 3.3.6.
- Evidence of compliance to SR18 is required by the applicant and the CAA prior to implementation.

4.1.1 Safety Requirement 2

The Applicant shall conduct a review of the AIP and MATS Part 2 to identify all references to the navigation aid being removed that impact their procedures.

As explained in the Farnborough Airport Impact Assessment [2] a comprehensive review of both the AIP and the MATS Part 2 has been conducted. The impact on the Farnborough operation was considered for all Instrument Flight procedures and AIP entries.

The withdrawal of the OCK DVOR effects the following Farnborough Airport IFP procedures and publications:

- EGLF 5-1 : ATC SMAC
- EGLF 8-1 : ILS/DME RWY 06
- EGLF 8-2 : LOC/DME RWY 06
- EGLF 8-3 : SRA RWY 06
- EGLF 8-4 : ILS/DME Y RWY 24
- EGLF 8-5 : ILS/DME Z RWY 24
- EGLF 8-6 : LOC/DME Y RWY 24

- EGLF 8-7 : LOC/DME Z RWY 24
- EGLF 8-8 : SRA Y RWY 24
- EGLF 8-9 : SRA Z RWY 24
- EGLF 4-2 : Control Zone and Control Area Chart
- EGLF 2.19 : Radio navigation Aids
- EGLF 2.22 : Flight procedures
- ENR 6-83 : Farnborough CTR & CTA Chart

Supporting evidence is listed at [SR2-1 \(Met\)](#), Farnborough Airport Impact Assessment [2], in [APPENDIX B](#).

Safety Requirement 2 is Met.

4.1.2 Safety Requirement 3

CAP1781 [1] shall only be applied if it can be demonstrated that only RNAV1 and RNAV5 certified aircraft and crews will be flying the procedure (or, as a minimum, such a significant proportion as to not impact ATS safety through ATC workload or similar).

Farnborough have confirmed that the RNAV Substitution for the OCK RT Fail and Missed Approach procedures will only apply to RNAV1 and RNAV5 equipped aircraft who are familiar with flying the Farnborough profiles using waypoint data stored within the aircraft FMS, rather than flying the conventional procedure based on a ground-based asset.

Note: Even though the RT Fail and Missed Approach procedures have never been flown, aircrews are familiar with these procedures and, as the aircraft are RNAV1 and RNAV5 compliant, the crews are therefore well able to use the overlays to fly the OCK procedures independent of the OCK DVOR. The removal of OCK navaid will have little effect as the majority of aircraft will continue to fly exactly as they would if the OCK DVOR were still in place.

Supporting evidence is listed at:

1. [SR3-1- Met](#), RNAV certified use only (NATS LOTG Minutes [6]).
2. [SR3-2 – Met](#) – Farnborough MATS Pt 2 [4] (information contained in the ATC SI [23] also [13]).
3. [SR3.3 – Conditionally Met subject to CAA approval for the inclusion of RNAV5.](#) – Inclusion of RNAV5 2.4.

In [APPENDIX B](#).

Safety Requirement 3 is Conditionally Met.

4.1.3 Safety Requirement 4

CAP1781 shall not be applied to Final Approach Procedures.

Farnborough Airport Ltd are not applying for CAP1781 RNAV Substitution for any Final Approach Procedures. As a result this safety requirement does not apply.

Safety Requirement 4 is not applicable.

4.1.4 Safety Requirement 5

An FMS overlay shall already exist for any procedure where CAP1781 is to be applied.

The Initial Approach Procedures for both Runway 06 and 24 are currently detailed in a dashed line on Farnborough IAPs, resulting in no coding FMS overlay being generated. This issue is being addressed prior to CAP1781 RNAV substitution being put into operation. Once this amendment is progressed, and coding houses have responded to Farnborough Airport Ltd.'s stipulation that RNAV coding for these elements shall be included on fleet FMS systems, this safety requirement will be shown as met.

ID	Company	Engagement Forum	Rationale
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SR5-1	Farnborough Airport	Email [10] [10a]	GM ATC Farnborough Advisory RNAV email to INEOS
SR5-2	Farnborough Airport	Email [18]	GM ATC Farnborough Advisory RNAV email to Acropolis Centreline
SR5-3	Farnborough Airport	Email [27]	GM ATC Farnborough Advisory RNAV email to Bae Systems Warton
SR5-4	Farnborough Airport	Email [29]	GM ATC Farnborough Advisory RNAV email to NetJets
SR5-5	Farnborough Airport	Email [28]	GM ATC Farnborough Advisory RNAV email to VistaJet
SR5-6	Farnborough Airport	Email [32]	GM ATC Farnborough Advisory RNAV email to Flexjet
SR5-7	INEOS	Email [36]	FLOPSC Minutes March 2023 and Lead Operator Minutes March 2023
SR5-8	Acropolis Centreline	Email [18]	Confirmation email from Acropolis Centreline. Private plane hire company at Farnborough Airport
SR5-9	Bae Systems Warton	Email [27]	Confirmation email from Flight Department – BAE Systems
SR5-10	NetJets	Email [29]	Confirmation email from NetJets. Private Jet charter regular flight operator at Farnborough Airport
SR-11	VistaJet	Email [30]	Confirmation email from VistaJet. Private Jet charter regular flight operator at Farnborough Airport
SR5-12	Flexjet	Email [31]	Confirmation email from Flexjet. Regular flight operator at Farnborough Airport

Table 4 – Farnborough Airport Aircraft Operator Stakeholder Engagement

Supporting evidence is listed at:

1. SR5-1 – **Met** – GM ATC Farnborough Advisory RNAV email to INEOS [10] [10a]
2. SR5-2 – **Met** – GM ATC Farnborough Advisory RNAV email to Acropolis Centreline [18]
3. SR5-3 – **Met** – GM ATC Farnborough Advisory RNAV email to BAE Systems Warton [27]
4. SR5-4 – **Met** – GM ATC Farnborough Advisory RNAV email to NetJets [29]
5. SR5-5 – **Met** – GM ATC Farnborough Advisory RNAV email to VistaJet [28]
6. SR5-6 – **Met** – GM ATC Farnborough Advisory RNAV email to Flexjet [32]
7. SR5-7 – **Conditionally Met** subject to CAA confirmation of approving FLOPSC & Lead Operator Minutes [6][37]
Confirmation email from INEOS Centreline [36]
8. SR5-8 – **Met** – Confirmation email from Acropolis Centreline [18]
9. SR5-9 – **Met** – Confirmation email from BAE Systems Warton [27]
10. SR5-10 – **Met** – Confirmation email from NetJets [30]
11. SR-11 – **Met** – Confirmation email from VistaJet [30]
12. SR5-12 – **Met** – Confirmation email from Flexjet [31]

In APPENDIX B.

Safety Requirement 5 is Conditionally Met

4.1.5 Safety Requirement 6

To mitigate GNSS unavailability, there shall be adequate DME/DME coverage in the area where CAP1781 [1] is to be applied. Information available from NERL.

Farnborough Airport has obtained the DME/DME coverage reports from NERL [8] see [section 5](#), which demonstrates sufficient DME/DME coverage in the event of GNSS unavailability.

Supporting evidence is listed at [SR6-1](#) (**Met**) DMD/DME Coverage Plots [section 5] and [8], in APPENDIX B.

Safety Requirement 6 is Met.

4.1.6 Safety Requirement 7

A baseline analysis to determine the current track over the ground of procedures where it is intended to apply CAP1781 shall be conducted prior to application for approval.

During the impact assessment [2] of the OCK DVOR withdrawal, it was noted that the procedures applicable to RNAV Substitution are rarely, if ever, flown due to needing to have experienced an RT failure, or a missed approach from ILS/DME or LOC/DME Y RWY 24.

System serviceability and redundancy means that operationally the elements being proposed for RNAV substitution are not flown unless such aircraft are in an emergency situation. Given this, it is not possible to provide over the ground performance data for these procedures.

Should an event occur resulting in an aircraft flying the procedure it will be radar monitored by the Farnborough Radar Controller and records kept of the actual track flown will be available through both radar recording and the airport local track keeping 'ANOMS' system. Any recorded RCF aircraft will be reported via the NATS STAR tool and formal MOR process.

NATS STAR incident recording data at Farnborough [15] indicates that there have been zero Aircraft RT failure events using the procedure recorded in the last 10 years. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]

On this basis, analysis has been conducted but there is no data to present; therefore this safety requirement can be deemed to be met.

Supporting evidence is listed at [SR7-19\(Met\)](#) RTF Track Data [\[section 7\]](#), in [APPENDIX B](#).

Safety Requirement 7 is Met.

4.1.7 Safety Requirement 8

The applicant shall provide evidence of engagement with General Aviation Stakeholders at the applicant's airport (where practicable), or which operate in the vicinity to raise awareness of the removal of the Navigation Aid and seek to identify alternative mitigations where the removal could potentially affect the applicant's operations through GA actions/interactions. If the Navigation Aid is a NERL asset, then NERL should assist the applicant.

NATS took part in a (CAA-led) consultation on the rationalisation programme with the National Air Traffic Management Advisory Committee (NATMAC) in 2008 where GA were a stakeholder. The NATMAC members were provided with a consultation paper which outlined NATS plans to rationalise the DVOR infrastructure; alongside being invited to provide feedback or questions on the proposal.

A follow-up informative letter was sent to NATMAC members in 2010 which summarised the results of the consultation. Additionally, NATS, through the DVOR Rationalisation Project, also provided the NATMAC members with an update on the project in 2018; including an explanation of the stages required to remove the navaid dependencies and how they will be physically removed from service. The CAA have formally approved the rationalisation programme, and in doing so taken due regard of consultation feedback from the GA community as a stakeholder.

Farnborough Airport has contacted its main operators and other stakeholders who will be impacted the RNAV Substitution of the Initial Approach Procedures and missed approaches for ILS/DME and LOC/DME Y Runway 24. The operators have confirmed that they can comply with CAP1926, therefore they are able to use an FMS coded overlay for the Initial Approach Procedures for Farnborough and the ILS/DME and LOC/DME Y for Runway 24, furthermore, they are familiar with the required operating procedures and content with the limitations associated with RNAV Substitution. Farnborough Airport Ltd General Aviation customer "QinetiQ Flying Club" confirmed that they will not be using the Initial Approach Procedures.

All aircraft expected to operate to/from Farnborough are expected to be RNAV equipped, although some may not be operating to RNAV1 criteria. The CAA has accepted that it is suitable to submit these procedures for RNAV Substitution on that basis.

Table 1 presents the list of impacted stakeholders

Id	Company	Engagement Forum	Rationale
SR8-1	Farnborough Airport	Email [13]	Stakeholder Engagement: GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club
SR8-2	Farnborough Aero Club	Email [13]	Farnborough Aero Club Response: GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club

Table 5 – Farnborough Airport Stakeholder Engagement

Supporting evidence is listed at:

1. [SR8-1](#) – **Met** – GM ATC Farnborough email to Farnborough Aero Club.
2. [SR8-2](#) – **Met** – Farnborough Aero Club response.

In [APPENDIX B](#).

Safety Requirement 8 is **Met.**

4.1.8 Safety Requirement 10

Check whether the FMS overlay for the procedure contains any of the ineligible leg types (path terminators) i.e., VI, CI, FD, CD, CR, VR, VD AF. Applicant may work with coding houses and CAA to seek to amend procedure provided no change to track over the ground if ineligible leg types are found.

A leg type describes the desired path proceeding, following, or between waypoints on an RNAV procedure. Leg types are identified by a two-letter code that describes the path (e.g. heading, course, track, etc.) and the termination point (e.g., the path terminates at an altitude, distance, fix, etc.). Leg types used for procedure design are included in the aircraft navigation database, but not normally provided on the procedure chart. The coding used for these leg types are reflected through an Industry standard document called ARINC² Specification 424. Currently there are 23 different path terminators defined in ARINC 424. However, only eleven of these path terminators are acceptable for RNAV procedure design use and ineligible leg types i.e., VI, CI, FD, CD, CR, VR, VD and AF have been found in the long term to be unsuitable for RNAV, as they can introduce wide variations in aircraft track performance as well as inconsistencies in charting and databases which tend to lead to confusion among pilots.

CAP1781 acceptance by CAA that sponsors do not have to check individual coding solutions regarding ineligible leg types.

See CAP178, page 23

Note: The CAA has received information from the three major navigation data providers concerning use of certain ARINC 424 Path Terminator types defined by the navigation aid as applied in coded overlays – see Example Safety Approach Safety Requirement (SR 9). The Path Terminators in question include CF, FA, FD, CD, CR, VR, VD and AF. The navigation data providers have assured the CAA that the majority of FMS do not use the actual DME (or VOR) for any Path Terminator construction. It is their understanding that the RNAV/RNP equipment use the DME position to compute a fixed location to construct the flight path. In other words, a waypoint is inserted, from which turn radius, speed and other predictions, and distances or bearings from a Latitude/Longitude may be defined in the data base. The CAA appreciates that with three major navigation data providers and multiple avionics manufacturers with potentially a significant number of different coding solutions for a conventional procedure, it would be impracticable to assure 100%

implementation of every single combination of coding and FMS. The CAA is satisfied with the assurances provided and therefore does not require sponsors to check individual coding solutions and accepts that SR 9 is satisfied, subject to the need for postimplementation monitoring of track keeping.

And page 27, Conditional Actions:

Data services providers –Jeppesen, Lufthansa Systems FlightNav, NAVBLUE In order to maintain track keeping as on today's conventional procedures, the Data service providers have agreed to maintain their coding in accordance with Data Quality Requirements (DQR), whereby, any proposed changes will first be agreed with the sponsor and the CAA.

CAA

CAA has raised Data Quality Requirements (DQR) with each of the major navigation data providers, in order to control the changes to FMS coded overlays captured within this guidance.

Supporting evidence is listed as SR10-1(Conditionally Met subject to the CAA agreeing to the Email explanation provided above) and in [APPENDIX B](#).

Safety Requirement 10 is Conditionally Met.

4.1.9 Safety Requirement 12

AIP Charts of procedures that will apply CAP1781 shall be amended as per the guidance in the CAP. Email evidence of CAA Approval of Updated Charts [17] GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]

Supporting evidence is listed at SR12.1(Met).

For readability, the proposed AIP Updates for Farnborough Airport have been included in [APPENDIX C](#) showing intended updates

Safety Requirement 12 is Met.

4.1.10 Safety Requirement 14

Additional text shall be added to the AD Section of the AIP as per CAP1781.

Supporting evidence that contains the AIP updates for Farnborough Airport is listed as SR14.1 and also email [13](Met)in [APPENDIX B](#).

Safety Requirement 14 is Met.

4.1.11 Safety Requirement 15

Where CAP1781 is being applied a Notice to Airmen (NOTAM) shall be raised at the time of withdrawal by the Navigation Aid Operator (NAO). The Applicant shall make the NAO aware that CAP1781 is being applied, coordinate the approach with the NAO to ensure no duplication or potential confusion and that the wording of the NOTAM and the time limits applied to it shall be in accordance with those specified in CAP1781.

Supporting evidence that contains the NOTAM updates for Farnborough Airport [26] and email [13] is listed as SR15.1(Met) in [APPENDIX B](#).

Safety Requirement 15 is Met.

4.1.12 Safety Requirement 16

The Airport shall include a message in the Automatic Terminal Information Service (ATIS) transmission or other means of dissemination (Datalink or Radio Telephony (RT)) regarding the unserviceability of the navaid for a period of at least 3 months. If the Applicant or Air Navigation Service Provider (ANSP) has safety issues or concerns regarding the length and/or complexity of the ATIS message other acceptable means of compliance should be discussed with CAA SARG.

Supporting evidence that contains the ATIS updates for Farnborough Airport is listed as SR16.1[26] and email [13] (Met) in [APPENDIX B](#).

Safety Requirement 16 is Met.

4.1.13 Safety Requirement 17

The track over the ground of aircraft flying a procedure where CAP1781 has been applied shall be analysed and compared with the baseline no less than annually or when requested by the CAA. Further action may be required if a change is determined to be significant.

System serviceability and redundancy means that operationally the elements being proposed for RNAV substitution are not flown operationally with any degree of regularity and constitute an unusual situation. Given this, it is not possible to provide track over the ground performance data for these procedures. Nevertheless, should the procedures ever be flown, tracks will be closely monitored and recorded appropriately.

Justification for this approach is shown in the STAR Data Investigation [15]

CAA agreement of this approach is required to meet this SR.

Supporting evidence that the CAA agree with the Farnborough Airport approach toward this SR is listed at SR17.1(Conditionally Met subject to CAA agreement that there is no track data available in APPENDIX B.

Safety Requirement 17 is Conditionally Met.

4.1.14 Safety Requirement 18

The CAA needs to provide specific approval before CAP1781 can be implemented by the Applicant [9]. The CAA will inform the Coding Houses that approval has been given and the Data Quality Requirement (DQR) activated.

Supporting evidence of the CAA approval is listed at SR18.1(Met.) in APPENDIX B.

Safety Requirement 18 is Met.

4.2 Safety Assessments

4.2.1 Safety Conclusion

The safety assessment workshops (APSAs [20] and [21] concluded that the RNAV Substitution change only resulted Risk Class D levels and it is therefore acceptably safe to implement this change.

- RNAV1 Aircraft RTF Workshop found no additional hazards associated with the RNAV1 substitution.
- RNAV5 Aircraft RTF Workshop3 hazards associated with the inclusion of RTF RNAV5 aircraft.
 - Aircraft Does Not Follow the Initial Approach.
 - Partway Through the Approach Procedure the Aircraft Flies an Unexpected Route.
 - Proximity of Proposed Procedure to Other Airspace Volumes.

4.2.2 Safety Workshops Associated with the Use of CAP1781

The APSAs were conducted to understand the nature of the change, identify any potential issues, and consider the hazards that could be introduced by applying CAP1781 RNAV Substitution.

In determining options for resolution of the OCK DVOR withdrawal two Farnborough RNAV Substitution SP406 Air Traffic Procedure Safety Analysis (APSA) Workshops were held.

- Workshop 1 - The RNAV1 RTF APSA [20] was held on 31/05/2023.
- Workshop 2 - The RNAV5 RTF APSA [21] was held on 09/05/2023.
- Workshop 3 - OCK Removal and RNAV Substitution of Farnborough IAPs APSA was held on 06/07/2023.
- Workshop 4 - Implementation of RNAV Substitution of Farnborough IAPs APSA was held on 06/07/2023.

The purpose was to review the SRs and to identify any safety concerns, assumptions, limitations, and shortcomings.

The assumptions in Para 4.3 were validated.

4.2.2.1 Workshop 1 - RNAV1 Aircraft RTF

The workshop result [20] found no additional hazards associated with the RNAV1 substitution.

The workshop considered the risk associated with the change from manually flying the current procedure to the introduction of an FMS inputted auto-pilot procedure (RNAV1 substitution).

The APSA workshop did not consider any hazards that exist with the current RTF procedure as they had already been assessed and mitigated. Additionally, even though the APSA LF/16/23, the RNAV5 APSA [21] associated with this change, identified 3 hazards (all Risk Class D), it should be noted that this RNAV1 procedure is less complex and has a smaller margin for error; therefore, it is reasonable that no additional hazards are considered relevant.

Workshop 1 Participants	
Name	Role
Farnborough ATCO	Facilitator and ATCO
Farnborough ATCO	ATCO

Table 6 – Workshop 1 Participants

4.2.2.2 Workshop 2 - RNAV5 Aircraft RTF

CAP1781 currently only states RNAV1 aircraft should be considered for RNAV substitution changes. The CAA have indicated that RNAV5 aircraft will be included in an update of the CAP1781. Even so, Farnborough have discussed with the CAA for the inclusion of RNAV5 aircraft in their RNAV Substitution submission, in advance of the update to the CAP1781 and the CAA have agreed with the inclusion of RNAV5 aircraft.

With this in mind, the RNAV5 Aircraft RTF APSA Workshop [21] identified 3 hazards associated with the inclusion of RTF RNAV5 aircraft.

- Aircraft Does Not Follow the Initial Approach.
- Partway Through the Approach Procedure the Aircraft Flies an Unexpected Route.
- Proximity of Proposed Procedure to Other Airspace Volumes.

All three were assessed post-mitigation as Risk Class D.

The risk assessments from the APSA are detailed below.

Workshop 2 Participants	
Name	Role
Farnborough ATCO	Facilitator and ATCO
Farnborough ATCO	ATCO
Farnborough ATCO	ATCO
Farnborough ATCO	ATCO

Table 7 – Workshop 2 Participants

4.2.2.2.1 Workshop 2, Risk Assessment 1 - Aircraft Does Not Follow the Initial Approach.

The risk assessment determined a post-mitigation Risk Class D. See the diagram below for the assessment:

3C - RISK ASSESSMENT (SINGLE SEQUENCE APPROACH)							
Incident Sequence & Outcome Describe the incident sequence and outcome which represents the WORST CREDIBLE risk associated with the hazard.		Aircraft is operating to RNAV 5 standards, and experiences RT failure en route. Aircraft follows the appropriate RNAV 5 STAR to PEPIS and then operates the RT failure track, plus or minus 5nm in accordance with RNAV5 standards. Aircraft is therefore outside controlled airspace for a portion of the flight, and comes into conflict with other traffic, either inside or outside controlled airspace leading to a loss of separation.					
Pre-Mitigation Assess the risk BEFORE any additional mitigation measures are adopted - use Tables 1 / 5 / 6 in SP406.		Mitigations Identify any reasonably practicable additional mitigation measures that could be applied. State:- 1. How they will be achieved 2. WHO is responsible for doing them 3. Any documentary evidence needed				Post-Mitigation Assess the risk AFTER any additional mitigation measures are adopted - use Tables 1 / 5 / 6 in SP406. The initial safety criterion for any outcome may be replaced by another safety criterion by the Operating Authority indicating the revised criterion in Part 3 of this form.	
Likelihood	Sev.	Risk		Likelihood	Sev.	Initial Safety Criterion	Risk
Remote	2	C		Remote	3	Remote	D
Remarks Whenever possible, provide:- - reasons for the choice of likelihood & severity values - claimed mitigation effects - any assumptions made.		Remote is shown as the likelihood given the paucity of RNAV 5 traffic operating into Farnborough, and the fact there have been no RT Failure events involving traffic inbound to Farnborough reported over the last 10 years. Mitigations established here are all around removal of other traffic from the background picture, and would reasonably be expected to occur during any such RT failure events.					

Figure 3 -Workshop 2, Risk Assessment 1

4.2.2.2.2 Workshop 2, Risk Assessment 2 - Partway Through the Approach Procedure the Aircraft Flies and Unexpected Route

The risk assessment determined a post-mitigation Risk Class D. See the diagram below for the assessment:

3B - RISK ASSESSMENT (BOW-TIE APPROACH)									
[Box 1] Hazard Causes Describe the various possible hazard causes.				[Box 5] Preventive Mitigations Identify practical preventative mitigations (to eliminate or reduce the likelihood of Box 1 hazard causes). State: 1. How they will be achieved 2. WHO is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the causes against which they protect.					
1 FMS update not applied to aircraft				General Manager ensures local operators are advised of FMS changes to be applied to fleets prior to implementation date.					
2 Equipment fit on aircraft mandates RNAV5 standard				No preventative mitigations					
3 Emergency situation creates multiple failures				No preventative mitigations					
[Box 2] PRE-Mitigation Hazard Frequency Estimate the pre-mitigation hazard frequency using SP406-Table 2.				[Box 6] POST-Mitigation Hazard Frequency Estimate the post-mitigation hazard frequency using SP406-Table 2. Take into account the hazard mitigations identified in Box 5.					
V.Low				V.Low					
[Box 3] Outcomes Describe credible characteristic outcomes arising from the hazard.		[Box 4] Pre-Mitigation Risk Assess the risk before any additional mitigation measures are adopted - using the pre-mitigation hazard frequency noted in Box 2 above and SP406 Tables 3,3 & 4.		[Box 7] Recovery Mitigations Identify any practical recovery mitigations. State: 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the outcome against which they protect.		[Box 8] Post-Mitigation Risk Assess the risk after the additional preventive (Box 5) and recovery (Box 7) mitigation measures are adopted - using post-mitigation hazard frequency noted in Box 6 above and SP406 Tables 3,3 & 4. The initial safety criteria for any outcome may be replaced by another safety criteria by the Operating Authority indicating the revised criteria in Part 4 of this form.			
		Sev.	Prob.	Risk		Sev.	Initial Safety Criteria	Prob.	Risk
1	No other aviation activity impacted, and aircraft lands safely.	NSE	Likely	n/a	None	PGE	n/a	Likely	n/a
2	Aircraft lands on wrong Runway, with potential loss of separation against other Aircraft	3	V.Unlikely	D	None	3	VL-LI	V.Unlikely	D
3	Infringement of other ATSU's airspace	3	Possible	D	None	3	VL-VL	Possible	D
4									
Remarks Wherever possible, provide: - the rationale behind the choice of frequency, severity & probability categories - the effects claimed from the mitigation - any assumptions made.									

Figure 4 -Workshop 2, Risk Assessment 2

4.2.2.2.3 Workshop 2, Risk Assessment 3 - Proximity of Proposed Procedure to Other Airspace Volumes

The risk assessment determined a post-mitigation Risk Class D. See the diagram below for the assessment:

3B - RISK ASSESSMENT (BOW-TIE APPROACH)									
[Box 1] Hazard Causes Describe the various possible hazard causes				[Box 5] Preventive Mitigations Identify practical preventative mitigations (to eliminate or reduce the likelihood of Box 1 hazard causes. State: 1. How they will be achieved 2. WHO is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the causes against which they protect					
1 RNAV 5 Aircraft deviation from expected track comes into conflict with other Airspace volume, as track is less than 5nm from other volumes				No preventative mitigations					
2 RNAV 1 equipped aircraft suffer failure of equipment required				SI generated by MOAT to include reference that any RT failure to be handled with caution, with an expectation that the track flown could be either one applicable to RNAV 1 or RNAV 5.					
3									
[Box 2] PRE-Mitigation Hazard Frequency Estimate the pre-mitigation hazard frequency using SP406-Table 2.				[Box 6] POST-Mitigation Hazard Frequency Estimate the post-mitigation hazard frequency using SP406-Table 2. Take into account the hazard mitigations identified in Box 5.					
V.Low				V.Low					
[Box 3] Outcomes Describe credible characteristic outcomes arising from the hazard.		[Box 4] Pre-Mitigation Risk Assess the risk before any additional mitigation measures are adopted - using the pre-mitigation hazard frequency noted in Box 2 above and SP406 Tables 1, 3 & 4		[Box 7] Recovery Mitigations Identify any practical recovery mitigations. State: 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the outcome against which they protect		[Box 8] Post-Mitigation Risk Assess the risk after the additional preventive (Box 5) and recovery (Box 7) mitigation measures are adopted - using post-mitigation hazard frequency noted in Box 6 below and SP406 Tables 1, 3 & 4 The initial safety criterion for any outcome may be replaced by another safety criterion by the Operating Authority indicating the revised criterion in Part 4 of this form.			
		Sev	Prob	Risk		Sev	Initial Safety Criterion	Prob	Risk
1	Infringement of other ATSU airspace with no impact.	NSE	V.Likely	n/a	No recovery mitigations	NSE	N/A	V.Likely	n/a
2	Infringement of other ATSU leading to rapid coordination requirement and controller workload	4	Possible	D	No recovery mitigations	4	VL-VL	Possible	D
3	Infringement of other ATSU airspace and a loss of separation occurs	2	Unlikely	D	No recovery mitigations	2	VL-L	Unlikely	D
4									
Remarks Wherever possible, provide: - the rationale behind the choice of frequency, severity & probability categories - the effects claimed from the mitigation - any assumptions made.									

Figure 5 – Workshop 2, Risk Assessment 3

4.2.2.3 Workshop 3 - OCK Removal and RNAV Substitution of Farnborough IAPs

The “OCK Removal and RNAV Substitution of Farnborough IAPs” APSA Workshop [34] identified 2 hazards associated with the RNAV substitution.

- RTF aircraft starts to follow the RTF procedure into EGLF or any other clutch airfields but Farnborough don't call a relevant adjacent ATSU.
- RTF aircraft starts the RTF routeing but the Farnborough controller doesn't clear a sufficiently large enough path ahead of its track.

Both were assessed post-mitigation as Risk Class D.

The risk assessments from the APSA are detailed below.

Workshop Participants	
Name	Role
Farnborough ATCO	Facilitator and ATCO
Farnborough ATCO	ATCO
Farnborough GM	ATCO
Farnborough ATCO	ATCO

Table 8 –Workshop 3 Participants

4.2.2.3.1 Workshop 3, Risk Assessment 1 - RTF aircraft starts to follow the RTF procedure into EGLF or any other clutch airfields but Farnborough don't call a relevant adjacent ATSU.

The risk assessment determined a post-mitigation Risk Class D. See the diagram below for the assessment:

3B - RISK ASSESSMENT (BOW-TIE APPROACH)				
[Box 1] Hazard Causes Describe the various possible hazard causes		[Box 5] Preventive Mitigations Identify practical preventative mitigations (to eliminate or reduce the likelihood of Box 1 hazard causes. State:- 1. How they will be achieved 2. WHO is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the causes against which they protect		
Controller forgets		none		
Controller doesn't think that the ATSU is a relevant one		none		
3				
[Box 2] PRE-Mitigation Hazard Frequency Estimate the pre-mitigation hazard frequency using SP406 Table 2.		[Box 6] POST-Mitigation Hazard Frequency Estimate the post-mitigation hazard frequency using SP406 Table 2. Take into account the hazard mitigations identified in Box 5.		
V.Low		V.Low		
[Box 3] Outcomes Describe credible characteristic outcomes arising from the hazard.		[Box 4] Pre-Mitigation Risk Assess the risk before any additional mitigation measures are adopted - using the pre-mitigation hazard frequency noted in Box 2 above and SP406 Tables 1, 3 & 4		[Box 7] Recovery Mitigations Identify any practical recovery mitigations. State:- 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the outcome against which they protect
		Sev.	Prob.	Risk
1	Aircraft follows the procedure accurately with no issues of entering another ATSUs airspace or leaving the RMA.	NONE	V.Likely	n/a
2	Aircraft follows the procedure inaccurately. It enters another ATSUs airspace or leaves the RMA. No LoS against non Farnborough traffic but increases workload.	4	Likely	D
3	Aircraft follows the procedure inaccurately. It enters another ATSUs airspace or leaves the RMA. Has a benign LoS against non Farnborough traffic and/or increases workload to an unsustainable level.	3	Possible	D
4	Aircraft follows the procedure inaccurately. It enters another ATSUs airspace or leaves the RMA. Has a critical LoS against non Farnborough traffic and/or increases workload beyond an acceptable level.	2	Unlikely	D
Remarks Whenever possible, provide:- - the rationale behind the choice of frequency, severity & probability categories - the effects claimed from the mitigation - any assumptions made		Usually an aircraft would squawk 7600 alerting all adjacent units thus reducing the hazard frequency. The procedure does stipulate that we are to call TC SW and therefore they may also pass on the message to say EGLL or SVFR. This therefore reduces the hazard frequency.		

Figure 6 – Workshop 3, Risk Assessment 1

4.2.2.3.2 Workshop 3, Risk Assessment 2 - RTF aircraft starts the RTF routing but the Farnborough controller doesn't clear a sufficiently large enough path ahead of its track.

The risk assessment determined a post-mitigation Risk Class D. See the diagram below for the assessment:

3B - RISK ASSESSMENT (BOW-TIE APPROACH)									
[Box 1] Hazard Causes Describe the various possible hazard causes.		[Box 5] Preventive Mitigations Identify practical/preventive mitigations to eliminate or reduce the likelihood of Box 1 hazard causes. State: 1. How they will be achieved 2. WHO is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the causes against which they protect.							
The aircraft was RNAV 1 but that is also now not working.		none							
Controller believes the aircraft is RNAV 1 but is actually not.		none							
Controller doesn't anticipate some of its manoeuvres.		none							
[Box 2] PRE-Mitigation Hazard Frequency Estimate the pre-mitigation hazard frequency using SP406 Table 1.		[Box 6] POST-Mitigation Hazard Frequency Estimate the post-mitigation hazard frequency using SP406 Table 2. Take into account the hazard mitigations identified in Box 5.							
V.Low		V.Low							
[Box 3] Outcomes Describe credible characteristic outcomes arising from the hazard.		[Box 4] Pre-Mitigation Risk Assess the risk before any additional mitigation measures are adopted - using the pre-mitigation hazard frequency noted in Box 2 above and SP406 Tables 1, 3 & 4.		[Box 7] Recovery Mitigations Identify any practical/recovery mitigations. State: 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the outcomes against which they protect.		[Box 8] Post Mitigation Risk Assess the risk after the additional preventive (Box 5) and recovery (Box 7) mitigation measures are adopted - using post-mitigation hazard frequency noted in Box 6 below and SP406 Tables 1, 3 & 4. The initial safety criterion for any outcome may be replaced by another safety criterion by the Operating Authority indicating the revised criterion in Part 4 of this form.			
		Sev.	Prob.	Risk		Sev.	Initial Safety Criterion	Prob.	Risk
1	Separation maintained and workload not increased.	NSE	V.Likely	n/a	na	NSE	N/A	V.Likely	n/a
2	Separation maintained and workload increased.	3	V.Likely	D	none	4	VL-VL	V.Likely	D
3	LoS with benign geometries and/or increases workload to an unsustainable level.	3	likely	D	none	3	VL-VL	likely	D
4	LoS with critical geometries and/or increases workload beyond an acceptable level.	2	Possible	D	none	2	VL-LI	Possible	D
Remarks Wherever possible, provide: - the rationale behind the choice of frequency, severity & probability categories - the effects claimed from the mitigation - any assumptions made.									

Figure 7 – Workshop 3, Risk Assessment 2

4.2.2.4 Workshop 4 - Implementation of RNAV Substitution of Farnborough IAPs

The “Implementation of RNAV Substitution of Farnborough IAPs” APSA Workshop [35][34] identified 1 hazard associated with the RNAV substitution.

- A pilot is unaware that the OCK is unserviceable.

It was assessed post-mitigation as Risk Class D.

The risk assessment from the APSA is detailed below.

Workshop Participants	
Name	Role
Farnborough ATCO	Facilitator and ATCO
Farnborough ATCO	ATCO

Table 9 –Workshop 4 Participants

4.2.2.4.1 Workshop 4, Risk Assessment 1 - A pilot is unaware that the OCK is Unserviceable.

The risk assessment determined a post-mitigation Risk Class D. See the diagram below for the assessment:

PART 3 - PROCEDURE HAZARD ANALYSIS (PHA) LOG				NATS PRIVATE					
APSA Title		Implementation of RNAV Substitution of EGLF Instrument Approach Procedures		APSA Ref.		LF/26/23			
3A - HAZARD									
Hazard No. (copied from the Part2 PH)		1							
Hazard Description (copied from the Part2 PH)		A pilot is unaware that OCK is unserviceable							
Complete EITHER Part 3B OR Part 3C. Notes: << Select 3b / 3c >> Selection of Part 3B OR 3C is at the discretion of the APSA Facilitator It is recommended that Part 3B is completed in the order in which the boxes have been numbered [Box 1 to 9] If a particular outcome is assessed as having NO safety effect then "NSE" should be entered as the severity and "n/a" as the associated risk. SECTION BELOW MAY NEED SCROLLING									
3B - RISK ASSESSMENT (BOW-TIE APPROACH)									
[Box 1] Hazard Causes Describe the various possible hazard causes				[Box 5] Preventive Mitigations Identify practical preventative mitigations (to eliminate or reduce the likelihood of Box 1 hazard causes. State:- 1. How they will be achieved 2. WHO is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the causes against which they protect					
NOTAM doesn't get sent correctly/written correctly				none					
NOTAM isn't sent				1, MOAT to ensure the NOTAM is sent to cover the duration of the TOI					
Not included on the ATIS				2, MOAT to ensure that the correct text is stored on the METCOM 3, MOAT to send an email to all assistants reminding them of the extra text to be added					
ATIS unserviceable and controller forgets to tell the pilot				none					
[Box 2] PRE-Mitigation Hazard Frequency Estimate the pre-mitigation hazard frequency using SP406-Table 2.				[Box 6] POST-Mitigation Hazard Frequency Estimate the post-mitigation hazard frequency using SP406-Table 2. Take into account the hazard mitigations identified in Box 5.					
Medium				Low					
[Box 3] Outcomes Describe credible characteristic outcomes arising from the hazard.		[Box 4] Pre-Mitigation Risk Assess the risk before any additional mitigation measures are adopted - using the pre-mitigation hazard frequency noted in Box 2 above and SP406 Tables 1, 3 & 4		[Box 7] Recovery Mitigations Identify any practical recovery mitigations. State:- 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the outcome against which they protect		[Box 8] Post-Mitigation Risk Assess the risk after the additional preventive [Box 5] and recovery [Box 7] mitigation measures are adopted - using post-mitigation hazard frequency noted in Box 6 below and SP406 Tables 1, 3 & 4 The initial safety criterion for any outcome may be replaced by another safety criterion by the Operating Authority indicating the revised criterion in Part 4 of this form.			
		Sev.	Prob	Risk		Sev.	Initial Safety Criterion	Prob	Risk
1	No affect to pilots	NSE	V.Likely	n/a	none	NSE	N/A	V.Likely	n/a
2	Pilot has an RT fail and follows the procedure correctly	NSE	Unlikely	n/a	none	NSE	N/A	Unlikely	n/a
3	Pilot has an RT fail and follows the procedure incorrectly. No LoS.	4	V.Unlikely	D	none	4	Lo-VL	V.Unlikely	D
4	Pilot has an RT fail and follows the procedure incorrectly. LoS benign geotremetries.	3	V.Unlikely	D	none	3	Lo-Li	V.Unlikely	D
5	Pilot has an RT fail and follows the procedure incorrectly. loS critical geotremetries.	2	V.Unlikely	D	none	2	Lo-Po	V.Unlikely	D
Remarks Whenever possible, provide:- - the rationale behind the choice of frequency, severity & probability categories - the effects claimed from the mitigation - any assumptions made.		The reason that outcomes 3,4,5 are included is because of the fact that the pilot may not have prepared for the procedure to be flown without OCK.							

Figure 8 – Workshop 4, Risk Assessment 1

Supplemental APSA Relating to RNAV Substitution of Missed Approach ILS/DME and LOC/DME Y 24

The “Supplemental APSA Relating to RNAV Substitution of Missed Approach ILS/DME and LOC/DME Y 24” APSA Workshop[36] identified 1 hazard associated with the RNAV substitution.

- RTF aircraft does not fly the missed approach procedure.

The hazard was assessed as post-mitigation Risk Class D.

The risk assessments from the APSA are detailed below.

Workshop Participants	
Name	Role
Farnborough ATCO	Facilitator and ATCO
Farnborough ATCO	ATCO

Table 10 –Supplemental APSA (Missed Approach) Participants

The risk assessment for the missed approach portion of the RNAV Substitution [36] determined a post-mitigation Risk Class D. See the diagram below for the assessment:

SECTION BELOW MAY NEED SCROLLING									
38 - RISK ASSESSMENT (BOW-TIE APPROACH)									
Box 1) Hazard Causes Describe the various possible hazard causes.		Box 5) Preventive Mitigations Identify practical preventative mitigations (to eliminate or reduce the likelihood of Box 1) hazard causes. State: 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the causes against which they protect.							
1 Aircraft required to execute missed approach from ILS/DME Y 24 or LOC/DME Y 24, and pilot requires FMS overlay to execute missed approach, instead of conventional RNAV.		RNAV Substitution process requires FMS coding houses to provide this data to fleets operating at Farnborough. EGLF General Manager to ensure Missed Approach is included within the FMS coding data pack, prior to AIRAC date when OCK VOR is removed.							
2									
3									
Box 2) PRE-Mitigation Hazard Frequency Estimate the pre-mitigation hazard frequency using IPDS Table 2.		Box 6) POST-Mitigation Hazard Frequency Estimate the post-mitigation hazard frequency using IPDS Table 2. Take into account the hazard mitigations identified in Box 5.							
Low		Low							
Box 3) Outcomes Describe credible downstream outcomes arising from the hazard.	Box 4) Pre-Mitigation Risk Assess the risk before any additional mitigation measures are adopted, using the pre-mitigation hazard frequency noted in Box 2 above and IPDS Table 3, 3.8.3	Box 7) Recovery Mitigations Identify any practical recovery mitigations. State: 1. How these will be achieved 2. Who is responsible for doing them 3. Any documentary evidence needed Mitigations should be documented in the cell corresponding to the outcomes against which they protect.	Box 8) Post-Mitigation Risk Assess the risk after the additional prevention (Box 5) and recovery (Box 7) mitigation measures are adopted, using post-mitigation hazard frequency noted in Box 6 above and IPDS Table 3, 3.8.4 The probability of an incident only outcome may be replaced by another safety outcome by the Operating Authority indicating the desired outcome in cell 4 of this form.						
	Sev. Prob. Risk		Sev. Initial Safety Conclusion Prob. Risk						
1	Missed Approach is executed and aircraft deviates from expected track/profile of missed approach. Aircraft is in RT contact with Farnborough and controller intervenes to resolve event.	4	likely	D	No recovery mitigations	4	Sev-M		
2	Missed Approach is executed and aircraft deviates from expected track/profile of missed approach. Aircraft is NOT in RT contact with Farnborough. ATCO only able to resolve by contacting other aircraft/ATSUs to resolve event	3	Possible	D	No recovery mitigations	3	Sev-L		
3	Missed Approach is executed and aircraft deviates from expected track/profile of missed approach. Deviation is not noticed by Controller or Aircraft is not in RT contact and resolution is not effective by ATC	2	Unlikely	D	No recovery mitigations	2	Sev-Po		
4	Missed Approach is executed and aircraft deviates from expected track/profile of missed approach. Deviation is not noticed by Controller and Aircraft is not in RT contact. Deviation infringes Farnborough Eye.	2	Unlikely	D	No recovery mitigations	2	Sev-Po		

6715/020 (Electronic ILI)

AATS Private

Page 2

Revised Procedures: (P) (M) (R) (C) (S) (T) (U) (V) (W) (X) (Y) (Z)

Remarks Reference profile, provide: - the nature of the hazard or frequency severity - a probability category - the effects claimed from the mitigation - any descriptions made.	Farnborough Eye is delegated airspace used by Kestrel Gliding club, the activation of which drives selection of ILS/DME Y 24. Outcome 4 scored as a 2 given the VPR nature of Farnborough Eye activity.
--	--

Figure 9 – Supplemental APSA (Missed Approach)

4.3 Assumptions

Table 11 details the assumptions applicable to the Impact Assessment [2] generated against the removal of the OCK DVOR.

Assumption Id	Assumption Description	Status	Remarks
SID SUB_ASM01	The FMS Overlays are encoded	Pending	The Initial Approach Procedures are to be coded following AIP promulgation in late 2023. CAA to confirm.
SID SUB_ASM02	There will be no change to aircraft type and/or carrier operations	Validated	
SID SUB_ASM03	That the Farnborough Airport FASI(S) ACP will provide a permanent solution	Validated	N/A
SID SUB_ASM04	A five-year IFP Review will be conducted, as agreed with the CAA	Validated	In action to align this with CAP1781 process

Table 11 – Farnborough CAP1781 Assumptions

4.4 Limitations

No Limitations have been identified to date.

4.5 Shortcomings

No Shortcomings have been identified to date.

4.6 Alternative Mitigation

The Impact Assessment conducted by Farnborough [2] concluded with the following recommendations:

- Using CAP1781 guidance, Farnborough Airport pursue through the regulator, approval to utilise RNAV substitution of OCK dependent Initial Approach Procedures and missed approaches (ILS/DME, LOC/DME and SRA RWY 09, ILS/DME Y, LOC/DME Y and SRA Y RWY 24 and ILS/DME Z, LOC/DME Z and SRA Z RWY 24, as detailed in AIP EGLF 8-1 to EGLF 8-9 inclusive), through an interim measure of aircraft FMS coding, thus allowing airlines to continue flying existing profiles without the ground-based asset.
- Required AIP administrative updates are completed to be incorporated in the AIP no later than AIRAC 13/23.
- Farnborough Airport continue with the full Future Airspace Strategy Implementation-South (FASI(S)) ACP programme so that it is concluded within existing timeframes, thus providing a permanent solution to the DVOR rationalisation programme, compliance with the AMS, and removing the dependency on interim RNAV substitution.
- RNAV5 inclusion.

Therefore, no alternative mitigation activities or procedures have been required.

5 DME Coverage

Whereas compliance with the RNAV1 and RNAV5 navigation specification can be achieved using Global Navigation Satellite Systems (GNSS). DME/DME position-fixing is identified as the key alternative to GNSS position fixing, to be used by aircraft either not equipped with GNSS capability, or by aircraft suffering from a fault in their GNSS equipment. Therefore, as a mix of ground and satellite-based capabilities provides a more resilient system, and to mitigate GNSS unavailability, RNAV Substitution can only be implemented if there is suitable availability of sufficient DME/DME coverage in the area where the CAP1781 is to be applied.

The following performance coverage and redundancy analysis was carried out by NERL [8] using EUROCONTROL's Distance Measuring Equipment Tracer (DEMETER) tool, version 2.3.1. However, it should be noted that:

"The coverage plots in this report are predictions. All analyses are based on these predictions. The DEMETER tool models, and algorithms have been subject to some validation, but the actual coverage and redundancy would need to be proven by flight inspection."

The meaning of the colour coding is:

- Black: No Coverage – indicates that there are no DME pairs covering the given area.
- Red: No Redundancy – indicates that there is only one DME pair covering the given area.
- Yellow: Limited Redundancy – indicates that there are two DME pairs covering the given area, but that they have a DME in common. If the common DME fails, the number of available pairs changes to zero.
- Green/Blue: Full Redundancy
 - Green indicates that there are two independent DME pairs covering the given area. If one of the DMEs fails, the number of available pairs changes to one.
 - Blue indicates that there are more than two independent DME pairs covering the given area. If one of the DMEs fails, the number of available pairs is at least two.

5.1 DME Coverage at Farnborough CTR/CTAs

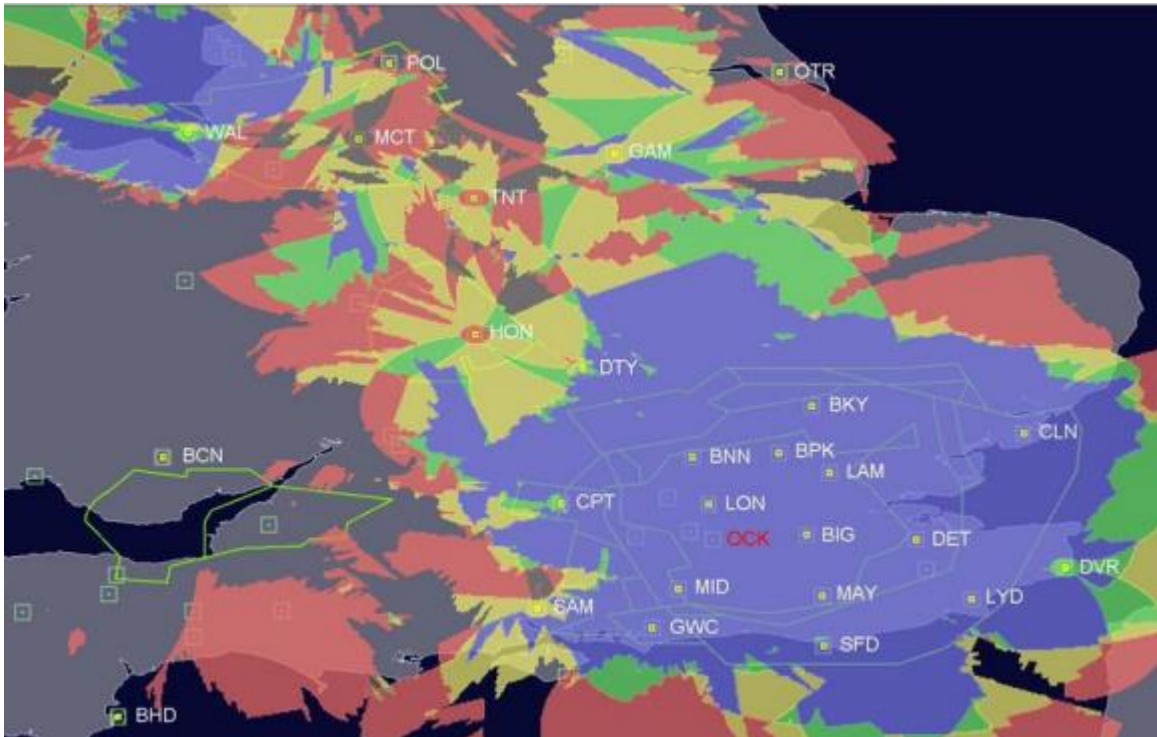


Figure 10 -Farnborough CTR/CTA 2,000ft AMSL – Current DME Infrastructure minus OCK DME

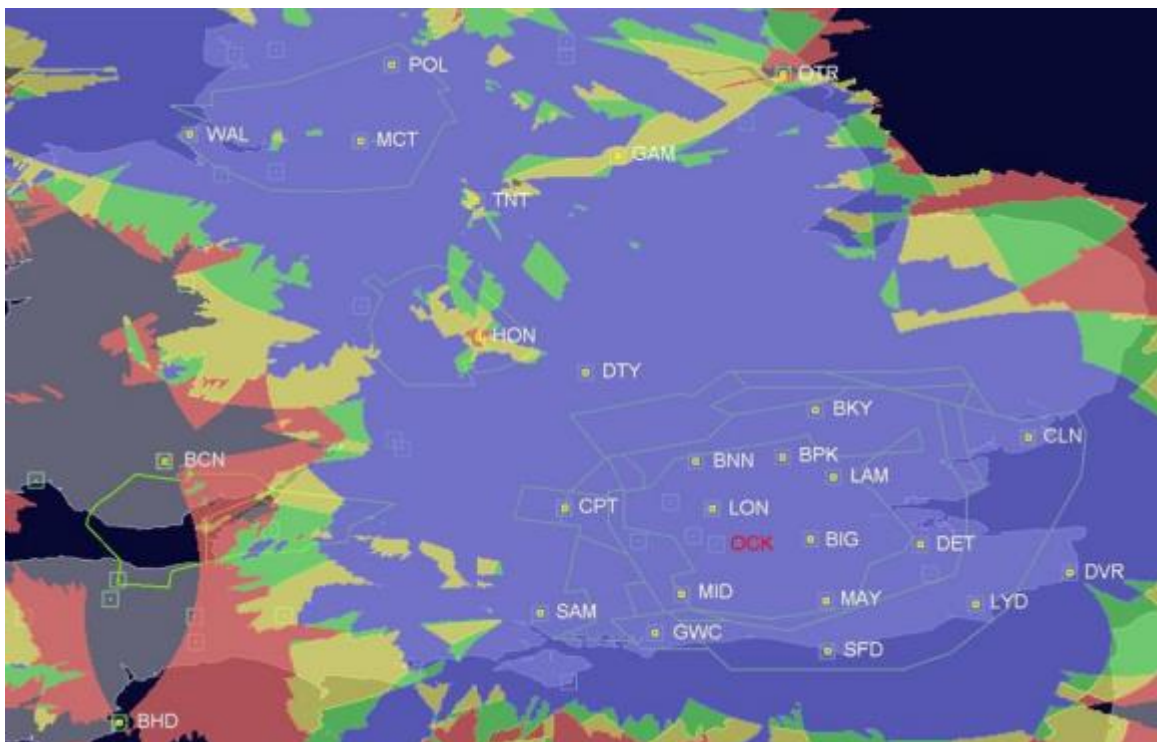


Figure 11 -Farnborough CTR/CTA 3,500ft AMSL – Current DME Infrastructure minus OCK DME

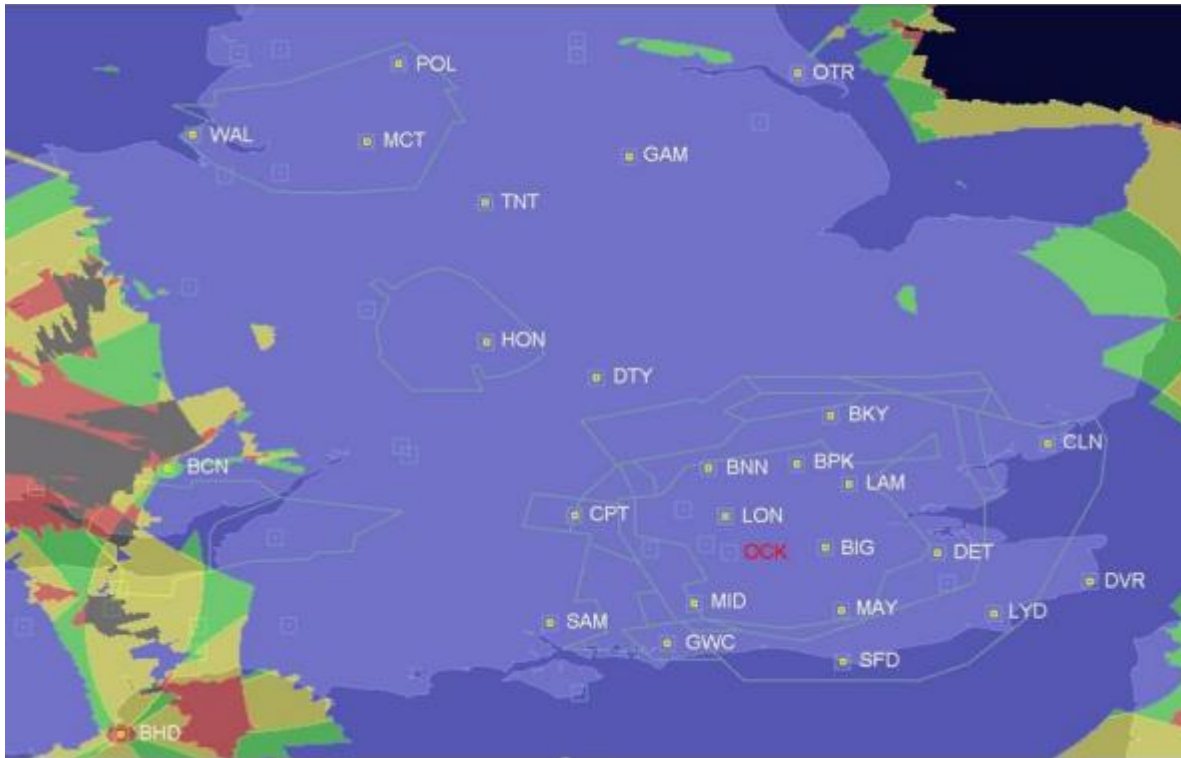


Figure 12 -Farnborough CTR/CTA 6,000ft AMSL – Current DME Infrastructure minus OCK DME

5.2 Data Coverage Conclusion

The DME coverage plots for the current DME/DME infrastructure, minus the OCK DME, depict a high coverage and redundancy provision to the Farnborough CTR/CTA at 2,000ft, 3,500ft and 6,000ft AMSL.

The coverage plots show there is sufficient coverage to meet the requirements of the Farnborough RNAV substitution project in the event of GNSS unavailability.

6 CO₂ Environmental Analysis Impact

As this application is for RNAV substitution using FMS overlays for the Initial Approach Procedures for Farnborough Runways 06 and 24, plus missed approaches for the ILS/DME, LOC/DME and SRA Y RWY 24, there will be no change to the lateral or vertical tracks of each procedure, or any change that will impact adjacent IFPs. Therefore, as this proposal to apply CAP1781 will not impact distance flown or vertical profile, it can be deduced that the fuel uplift should not change, therefore there will be no change in fuel, CO₂, or greenhouse gas emissions as a result of applying CAP1781.

7 Baseline Track Over the Ground Performance Data

For each procedure where use of CAP1781 is proposed a baseline set of current tracks over the ground performance data shall be provided. This data is required to demonstrate the spread of current tracks on the procedure and will help to facilitate the post implementation analysis once the navaid is removed to demonstrate that there is no change to the baseline aircraft performance and track over the ground which could be considered to be significant by either the CAA or the Applicant.

During the impact assessment [2] of the OCK DVOR withdrawal, it was noted that the procedures applicable to RNAV Substitution are rarely, if ever, flown due to needing to have experienced an RT failure, or a missed approach from ILS/DME or LOC/DME Y RWY 24. On this basis, the CAA accepted provision of current track across the ground data was impracticable.

8 Conclusion

This CAP Compliance Report contains the Safety Review, DME/DME coverage, and baselined Ground Performance Data reports that are required as part of the documentation pack for CAA Approval.

In order for this report to conclude that Farnborough Airport Ltd has provided the Safety and GSN requirement evidence and the documentation required meet the approval for the Farnborough RNAV Substitution (CAP1781) the following actions must be addressed:

1. Gaining CAA approval and agreement as shown in Tables 1 and 2.
2. Providing evidence that all airport operators have been informed of the RNAV substitution and those that have not responded, CAA approval that the FLOPSC and Lead Operator Minutes are acceptable.

The safety assessment workshops (APSAs [20] [21] [34], [35] and [36]) concluded that the RNAV Substitution change only resulted Risk Class D levels and it is therefore acceptably safe to implement this change.

The DME Coverage Report has shown that although the plots for the current DME/DME infrastructure portray a high coverage and redundancy provision to the Farnborough CTA at 2,000ft, 3,500ft and 6,000ft AMSL. The OCK DVOR withdrawal does not impact the DME coverage that is required to support RNAV1 and RNAV5 in the event of GNSS unavailability.

Therefore, once points 1 and 2 (above) are met, it can be concluded that Farnborough Airport Ltd has provided sufficient evidence and the required documentation to request approval from the CAA to apply the DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781).

APPENDIX A Farnborough Airport GSN Safety Argument – Status of Evidence Items

Table presents details of evidence items identified for each sub-goal of the GSN

Table 12 – Farnborough Airport Ltd Safety Argument Status of Evidence Items

Goal 1 DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781) to mitigate the OCK DVOR removal for the IAPs at Farnborough Airport is acceptably safe.				
Id	Description	Responsible Work Package	Status	Argument Contribution
Goal 2 Farnborough Airport can demonstrate that users of each procedure where the policy is to apply, are RNAV1 compliant and there is adequate DME/DME cover to support RNAV1 in the event of GNSS unavailability				
E2-1	Safety Review (this document)	NATS Safety	MET Complete	Evidence that Safety Review has been completed to assess the safety requirements, and identify any safety issues, assumptions, limitations, and shortcomings
E2.2	DME / DME Coverage [8]	NERL DME Project	MET Complete	Evidence from the DME Project regarding DME Coverage
E2.3	Inclusion of RNAV5	Farnborough Airport / CAA Agreement	Conditionally MET	Evidence that it is safe to include RNAV5 Equipage within this Compliance Report. Conditionally Met subject to CAA approval for the inclusion of RNAV5.
Goal 3: Farnborough Airport can demonstrate that an FMS overlay exists for each procedure where RNAV substitution is to be used and aircraft that will fly that procedure are RNAV1 compliant				
E3.1	Safety Review (this document)	NATS Safety	MET Complete	Evidence that Safety Review has been completed to assess the safety requirements, and identify any safety issues, assumptions, limitations, and shortcomings
E3.2	Inclusion of RNAV5	Farnborough Airport / CAA Agreement	Conditionally MET	Evidence that it is safe to include RNAV5 Equipage within this Compliance Report. Conditionally Met subject to CAA approval for the inclusion of RNAV5.
Goal 4: Farnborough Airport has conducted a review to identify all references to the OCK DVOR to be removed in the AIP (e.g., Local flight procedures, ATC procedures etc)				
E4-1	Farnborough Airport Impact Assessment [2]	Farnborough Airport	MET Complete	Farnborough Airport's Impact Assessment provides the evidence that a review of the AIP and the MATS Pt2 has been completed.
Goal 5: All procedures identified in the impact assessment Error! Reference source not found. have been reviewed, and mitigation, either the use of CAP1781 or an alternative has been identified to allow the removal of the navigation aid				

Goal 1 DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781) to mitigate the OCK DVOR removal for the IAPs at Farnborough Airport is acceptably safe.				
Id	Description	Responsible Work Package	Status	Argument Contribution
E5-1	Safety Review (this document)	NATS Safety	MET Complete	Evidence that Safety Review V1 has been completed to assess the safety requirements, and identify any safety issues, assumptions, limitations, and shortcomings
E5-2	CAA Approval [9]	CAA	MET Complete	Evidence that approval has been granted from the CAA to use CAP1781 RNAV Substitution
E5-3	Coding Houses DQR – Activation	CAA	Conditionally MET	Evidence that the CAA has informed the coding houses and has developed and activated a Data Quality Requirement (DQR) with all FMS coding houses. Conditionally Met subject to CAA action approval and confirmation of Coding House DQR by the CAA.
Goal 6: ATC, Pilots, Operators, and coding houses are sufficiently aware that RNAV substitution is being used following this change				
E6-1	AIP Updates [Appendix C] showing intended updates	Farnborough Airport	MET Complete	Evidence to show that Farnborough Airport has made the necessary AIP updates. Email evidence of CAA Approval of Updated Charts [17]
E6-2	ATC Local flight procedure updates [13]	Farnborough Airport	MET Complete	Evidence to show update to MATS pt2. Evidence contained in the ATC SI [23] Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]
E6-3	NOTAM and ATIS updates regarding the OCK withdrawal. [13]	Farnborough Airport	MET Complete	Evidence of NOTAM and ATIS update. Information provided in the TOI [26] Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]
E6-4	GA (Farnborough Aero Club) Informed [13]	Farnborough Airport	MET Complete	Evidence to show engagement evidence with GA
E6-5	Coding Houses Notification	CAA	Conditionally MET	Evidence that the CAA has informed the coding houses of the change. Conditionally Met subject to CAA action (CAA notification to the Coding Houses).
Goal 7: Safety Performance Monitoring will ensure that any degradation of the current baseline is identified, and action taken to resolve in a timely manner				
E7-1	Performance Monitoring Plan	Farnborough Airport	MET Complete	Evidence of how Farnborough will carry out performance and monitoring is via the ATC SI [23]. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]

Goal 1 DVOR/DME/NDB Rationalisation – Guidance for the use of RNAV Substitution (CAP1781) to mitigate the OCK DVOR removal for the IAPs at Farnborough Airport is acceptably safe.				
Id	Description	Responsible Work Package	Status	Argument Contribution
E7-2	Baseline Track over the ground analysis	Farnborough Airport	MET Complete	Evidence regarding Farnborough's current baseline analysis is via the STAR Data Investigation [15], which shows no track data is available due to there being no aircraft RTF incidents in the last 10 years. Therefore, no base-line track data available. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]
Goal 8: The Unit Safety Case and the MATS Part 2 have been reviewed and any updates identified				
E8-1	Unit Safety Case Updates	Farnborough Airport	MET Complete	Evidence of USC updates or statement that no update is required [19].
E8-2	Safety Review (this document)	NATS Safety	MET Complete	Evidence that Safety Review has been completed to assess the safety requirements, and identify any safety issues, assumptions, limitations, and shortcomings
E8-3	MATS Pt 2 Updates	Farnborough Airport	MET Complete	Evidence of the Farnborough MATS Pt 2 updates. Evidence contained in the ATC SI [23]. Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]

APPENDIX B CAP1781 – Detailed Status of Safety Requirements

Table 13 – Detailed Status of Safety Requirements

Id	Description	Responsible Work Package	Status	Safety Requirement Contribution
SR 2 The Applicant shall conduct a review of the AIP and MATS Part 2 to identify all references to the navigation aid being removed that impact their procedures				
SR2-1	Farnborough Airport Impact Assessment [2]	Farnborough Airport	MET Complete	Farnborough Airport's Impact Assessment provides the evidence that a review of the AIP and the MATS Pt2 has been completed.
SR 3: CAP1781 shall only be applied if it can be demonstrated that only RNAV1 and RNAV5-certified aircraft and crews will be flying the procedure (or, as a minimum, such a significant proportion as to not impact ATS safety through ATC workload or similar).				
SR3-1	NATS Lead Operator Technical Group Meeting Minutes [6]	Farnborough Airport	MET Complete	Evidence from Farnborough GM ATC Services that only RNAV1 and 5 certified aircraft will be flying RNAV Substituted procedures. Meeting minutes where operators are informed of RNAV substitution requirements.
SR3-2	Farnborough MATS Pt 2 [4] (information contained in the ATC SI [23]). Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]).	Farnborough Airport	MET Complete	Evidence regarding documented procedure. Evidence contained in the ATC SI [23] and email [13]
SR3-3	Inclusion of RNAV5	Farnborough Airport / CAA Agreement	Conditionally MET	Evidence that it is safe to include RNAV5 Equipage within this Compliance Report. Conditionally Met subject to CAA approval for the inclusion of RNAV5.
SR 4: CAP1781 shall not be applied to Final Approach Procedures				
N/A	N/A	N/A	N/A	N/A
SR 5 An FMS overlay shall already exist for any procedure where CAP1781 is to be applied				
SR5-1	GM ATC Farnborough Advisory RNAV email to INEOS [10] [10a]	Farnborough Airport	MET Complete	Engagement evidence from Farnborough Airport to INEOS
SR5-2	GM ATC Farnborough Advisory RNAV email to Acropolis Centreline [14]	Farnborough Airport	MET Complete	Engagement evidence from Farnborough Airport to Acropolis Centreline
SR5-3	GM ATC Farnborough Advisory RNAV email to BAe Systems Warton [24]	Farnborough Airport	MET Complete	Engagement evidence from Farnborough Airport to BAe Systems Warton

Id	Description	Responsible Work Package	Status	Safety Requirement Contribution
SR5-4	GM ATC Farnborough Advisory RNAV email to NetJets [29]	Farnborough Airport	Met Complete	Engagement evidence from Farnborough Airport to NetJets.
SR5-5	GM ATC Farnborough Advisory RNAV email to VistaJet [30]	Farnborough Airport	MET Complete	Engagement evidence from Farnborough Airport to VistaJet.
SR5-6	GM ATC Farnborough Advisory RNAV email to Flexjet[32]	Farnborough Airport	MET Complete	Engagement evidence from Farnborough Airport to Flexjet
SR5-7	Engagement evidence confirmation email from INEOS [11]	Farnborough Airport	Conditionally Met	FLOPSC Minutes March 2023 and Lead Operator Minutes March 2023 Conditionally Met subject to CAA approval of FLOPSC & Lead Operator Minutes
SR5-8	Engagement evidence confirmation email from Acropolis Centreline [18]	Farnborough Airport	MET Complete	Engagement evidence from Acropolis Centreline
SR5-9	Engagement evidence confirmation email from BAe Systems Warton [27]	Farnborough Airport	MET Complete	Engagement evidence from BAe Systems Warton.
SR5-10	Engagement evidence confirmation email from NetJets [11]	Farnborough Airport	MET Complete	Engagement evidence from NetJets
SR5-11	Engagement evidence confirmation email from VistaJet [30]	Farnborough Airport	MET Complete	Engagement evidence from VistaJet
SR5-12	Engagement evidence confirmation email from Flexjet [31]	Farnborough Airport	Met Complete	Engagement evidence from Flexjet.
SR 6: To mitigate GNSS unavailability, there shall be adequate DME/DME coverage in the area where the CAP1781 is to be applied. Information available from NERL.				
SR6-1	DMD/DME Coverage Plots Current and proposed [section 5]	NERL DME Project	MET Complete	Evidence from NERL to show DME/DME coverage [8]
SR 7: A baseline analysis to determine the current track over the ground of procedures where it is intended to apply CAP1781 shall be conducted prior to application for approval				
SR7-1	RTF Track Data [section 7] Also GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]).	Farnborough Airport	MET Complete	Evidence to show current track over the ground from RTF Track Data and email [13]. Note: Investigation of the STAR database has shown that there have not been any aircraft RT failure incidents using the procedure at Farnborough [15] therefore, there is no track data to present.

Id	Description	Responsible Work Package	Status	Safety Requirement Contribution
SR 8: The applicant shall provide evidence of engagement with General Aviation Stakeholders at the applicant's airport (where practicable), or which operate in the vicinity to raise awareness of the removal of the Navigation Aid and seek to identify alternative mitigations where the removal could potentially affect the applicant's operations through GA actions/interactions. If the Navigation Aid is a NERL asset, then NERL should assist the applicant.				
SR8-1	Stakeholder Engagement: GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]	Farnborough Airport	MET Complete	Engagement evidence from Farnborough Airport to Farnborough Aero Club (GA)
SR8-2	Farnborough Aero Club Response: GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club [13]	Farnborough Aero Club	MET Complete	Engagement evidence from Farnborough Aero Club
SR 10: Check whether the FMS overlay for the procedure contains any of the ineligible leg types i.e., VI, CI, FD, CD, CR, VR, VD AF. Applicant may work with coding houses and CAA to seek to amend procedure provided no change to track over the ground if ineligible leg types are found.				
SR10.1	Email showing CAP1781 acceptance by CAA that sponsors do not have to check individual coding solutions regarding ineligible leg types. [9]	Farnborough Airport	Conditionally MET	See CAP178, page 23, Note: Note: The CAA has received information from the three major navigation data providers concerning use of certain ARINC 424 Path Terminator types defined by the navigation aid as applied in coded overlays - see Example Safety Approach Safety Requirement (SR 9). The Path Terminators in question include CF, FA, FD, CD, CR, VR, VD and AF. The navigation data providers have assured the CAA that the majority of FMS do not use the actual DME (or VOR) for any Path Terminator construction. It is their understanding that the RNAV/RNP equipment use the DME position to compute a fixed location to construct the flight path. In other words, a waypoint is inserted, from which turn radius, speed and other predictions, and distances or bearings from a Latitude/Longitude may be defined in the data base. The CAA appreciates that with three major navigation data providers and multiple avionics manufacturers with potentially a significant number of different coding solutions for a conventional procedure, it would be impracticable to assure 100% implementation of every single combination of coding and FMS. The CAA is satisfied with the assurances provided and therefore does not require sponsors to check individual

Id	Description	Responsible Work Package	Status	Safety Requirement Contribution
				coding solutions and accepts that SR 9 is satisfied, subject to the need for postimplementation monitoring of track keeping And page 27, Conditional Actions: Data services providers –Jeppesen, Lufthansa Systems FlightNav, NAVBLUE In order to maintain track keeping as on today's conventional procedures, the Data service providers have agreed to maintain their coding in accordance with Data Quality Requirements (DQR), whereby, any proposed changes will first be agreed with the sponsor and the CAA. CAA CAA has raised Data Quality Requirements (DQR) with each of the major navigation data providers, in order to control the changes to FMS coded overlays captured within this guidance. Conditionally Met subject to the CAA agreeing to the Email explanation [12] provided above.
SR 12: AIP Charts of procedures that will apply CAP1781 shall be amended as per the guidance in the CAP.				
SR12.1	AIP Updates Farnborough Airport see APPENDIX C showing intended updates. Also [21][13]	Farnborough Airport	MET Complete	Evidence that contains the proposed AIP Updates for Farnborough Airport. Email evidence of CAA Approval of Updated Charts [17] and [21][13]
SR 14: Additional text shall be added to the AD Section of the AIP as per CAP1781				
SR14.1	Additional text that Farnborough will add to the AD Section of the AIP, see APPENDIX C and also email [13]	Farnborough Airport	MET Complete	Evidence that contains the proposed text addition for the AIP.
SR 15: Where CAP1781 is being applied a NOTAM shall be raised at the time of withdrawal by the Navigation Aid Operator (NAO). The Applicant shall make the Navigation Aid Operator aware that CAP1781 is being applied, coordinate the approach with the NAO to ensure no duplication or potential confusion and that the wording of the NOTAM and the time limits applied to it shall be in accordance with those specified in CAP1781.				

Id	Description	Responsible Work Package	Status	Safety Requirement Contribution
SR15.1	Confirmation regarding NOTAM requirement and the coordinated approach between Farnborough and NERL	Farnborough Airport	MET Complete	Evidence that contains the coordinated approach between Farnborough Airport and NATS (NERL) regarding the OCK Withdrawal NOTAM. Information provided in the TOI [26]. Also email [13]
SR 16: The Airport shall include a message in the ATIS transmission or other means of dissemination (Datalink or RT) regarding the unserviceability of the navigation aid for a period of at least 3 months. If the Applicant or ANSP has safety issues or concerns regarding the length and/or complexity of the ATIS message other acceptable means of compliance should be discussed with CAA SARG				
SR16.1	Email confirmation regarding ATIS transmission requirements [26] [13]	Farnborough Airport	MET Complete	Evidence that confirms that Farnborough Airport will implement an ATIS message regarding the OCK withdrawal for a period of at least 3 months. Information provided in the TOI [26] and [13].
SR 17: The track over the ground of aircraft flying a procedure where CAP1781 has been applied shall be analysed and compared with the baseline no less than annually or when requested by the CAA. Further action may be required if a change is determined to be significant.				
SR17.1	CAA agreement that Farnborough Airport are not routinely able to provide track-over-the-ground data is required to meet this SR.	Farnborough Airport / CAA	Conditionally MET	The RT Fail and Missed Approach procedures have not been used in the last 10 years (STAR Data Investigation [15]) and therefore assessing that track-over-the-ground is being correctly adhered to will not be possible. Nevertheless, should the procedures ever be flown in the future, Mandatory Occurrence Reporting will trigger review activity with the CAA. Conditionally Met subject to CAA agreement that there is no track data available.
SR 18: The CAA needs to provide specific approval before CAP1781 can be implemented by the Applicant. The CAA will inform the Coding Houses that approval has been given and the DQR activated.				
SR18.1	CAA approval that CAP1781 can be implemented by Farnborough Airport [9]	CAA	MET Complete	Evidence of the CAA approval

APPENDIX C - Farnborough Airport Proposed AIP Updates

The proposed AIP updates for Farnborough Airport Ltd are captured in the Farnborough 5 Year IFP review.

APPENDIX D - Acronyms and Abbreviations

The following is a list of the key acronyms used within this document.

Table 14 – Acronyms and Abbreviations

Acronym or Abbreviation	Meaning
AAMC	Alternative Acceptable Means of Compliance.
ACP	Airspace Change Proposal.
AIP	Aeronautical Information Publication
ANSP	Air Navigation Service Provider
AMC	Acceptable Means of Compliance
AMS	Airspace Modernisation Strategy
APSA	Air Traffic Procedure Safety Analysis
ATIS	Automatic Terminal Information Service
CAA	Civil Aviation Authority.
DME	Distance Measuring Equipment
DEMETER	Distance Measuring Equipment Tracer
DQR	Data Quality Requirement
DVOR	Doppler Very High Frequency Omni Range
FMS	Flight Management System
FASI(S)	Future Airspace Strategy Implementation-South
GA	General Aviation
GS	Group Supervisor.
HazID	Hazard Identification / Analysis.
IAPs	Instrument Approach Procedures
IFPs	Instrument Flight Procedures
Nav aids	Navigation aids
NAO	Navigation Aid Operator
NERL	NATS En-Route Limited.
NDBs	Non-Directional Beacons
NMS	NATS Management System.
NOTAM	Notice to Airmen
Ock	Ockham
PHI	Preliminary Hazard Identification.
SID(s)	Standard Instrument Departure(s)
SMM	Safety Management Manual.
SMS	Safety Management System.
SP	Safety Procedure.

Acronym or Abbreviation	Meaning
SR(s)	Safety Requirements
STARs	Standard Arrival Routes

APPENDIX E - References

Table 15 – References

Evidence Item	Reference Title / Description	Document Number	Issue / Version / Date
[1]	CAP1781: DVOR / DME / NDB Rationalisation: Guidance for the use of RNAV Substitution	<u>CAP1781</u>	August 2022
[2]	Farnborough Impact Assessment – Withdrawal of the OCK DVOR	Compliance Report Evidence Items Folder	Issue 1 / 23 March 2023
[3]	CAP1781b DVOR/DME/NDB Rationalisation: Guidance for the use of RNAV Substitution - Example Safety Approach	<u>5382/SAF/02</u>	February 2020
[4]	Farnborough MATS Pt2. Evidence contained in the ATC SI [23]	See [23]	N/A
[5]	CAP1926 General Requirements and Guidance Material for the use of RNAV Substitution	<u>CAP1926</u>	16, February 2022
[6]	Engagement evidence from Farnborough Airport to Aviation Community VOR Rationalisation - Withdrawal of the OCK VOR Farnborough Lead Operator Technical Group Meeting Minutes	Compliance Report Evidence Items Folder	13 June 2023
[7]	CAP1616	<u>CAP 1616</u>	16/03/2021
[8]	Farnborough DME Coverage - Removal from Service of OCK DME (Coverage & Redundancy Analysis)	ANAV/RPT/67	Issue 1 / Jul 2022
[9]	CAA Approval – Farnborough Statement of Need [16] and Approved for Use of CAP1781	Compliance Report Evidence Items Folder	Email dated 03 April 2023
[10] [10a]	GM ATC Farnborough Advisory RNAV email to INEOS.	Compliance Report Evidence Items Folder	Emails dated 27 July 2023 and 10 August 2023
[11]	Engagement evidence Confirmation from INEOS [6] [37]	Compliance Report Evidence Items Folder	FLOPSC and Lead Operator Minutes
[12]	No Ineligible Leg Types (AAMC from CAP1781) (SR10)	Compliance Report Evidence Items Folder	Email: 09/05/2023
[13]	GM ATC Farnborough Email Updates for MATS Pt2, APSAs, NOTAMs and Farnborough Aero Club (GA)	Compliance Report Evidence Items Folder	Email dated 10/07/2023 at
[14]	GM ATC Farnborough Advisory RNAV email to Acropolis Centreline.	Compliance Report Evidence Items Folder	Email dated 11 August 2023
[15]	STAR RT Failures - Farnborough	Compliance Report Evidence Items Folder	Excel Spreadsheet
[16]	Farnborough Statement of Need for OCK Removal	Compliance Report Evidence Items Folder	Dated 27 April 2023
[17]	CAA Approval of Farnborough RCF to Initial Approach Charts	Compliance Report Evidence Items Folder	Email dated 4 July 2023
[18]	Engagement evidence confirmation email from Acropolis Centreline	Compliance Report Evidence Items Folder	Email dated 18 August 2023
[19]	No Updates to Farnborough Airport Unit Safety Case	Compliance Report Evidence Items Folder	Email dated 03/07/2023
[20]	Farnborough Air Traffic Procedure Safety Analysis (APSA) LF/15/23 – RNAV1 RTF on Removal of OCK DVOR	Compliance Report Evidence Items Folder	LF/15/23 dated 31/05/2023

NATS PRIVATE

[21]	Farnborough Air Traffic Procedure Safety Analysis (APSA) LF/16/23 – RNAV5 RTF on Removal of OCK DVOR	Compliance Report Evidence Items Folder	LF/16/2023 dated 09/05/2023
[22]	Email evidence from GM ATC Services that only RNAV1 and 5 certified aircraft will be flying RNAV Substituted RTFs. RNAV certified use only (Farnborough LOTG Minutes [6])	Compliance Report Evidence Items Folder	See Item 6
[23]	ATC Supplementary Instruction Draft for Approval - Evidence regarding documented procedure for RNAV1 and 5 aircraft Removal of OCK VOR and information to be included in for the MATS Pt 2.	Compliance Report Evidence Items Folder	Draft Received. Final expected 02/11/2023
[24]	GM ATC Farnborough Advisory RNAV email to BAe Systems Warton	Compliance Report Evidence Items Folder	Email dated 11 August 2023
[25]	GM ATC Farnborough Advisory RNAV email to NetJets	Compliance Report Evidence Items Folder	Email dated 18 August 2023
[26]	Farnborough TOI for NOTAM and ATIS action also [13]	Compliance Report Evidence Items Folder	Draft Received. Final expected 02/11/2023
[27]	Engagement evidence confirmation email from BAE Systems Warton	Compliance Report Evidence Items Folder	Email dated 22nd August 2023
[28]	GM ATC Farnborough Advisory RNAV email to VistaJet	Compliance Report Evidence Items Folder	Email dated 2 nd August 2023
[29]	Engagement evidence confirmation email from NetJets [30]	Compliance Report Evidence Items Folder	Email dated 30/08/23
[30]	Engagement evidence confirmation from VistaJet	Compliance Report Evidence Items Folder	Email dated 30/08/23
[31]	Engagement evidence confirmation email from Flexjet	Compliance Report Evidence Items Folder	Email dated 18/08/23
[32]	GM ATC Farnborough Advisory RNAV email to Flexjet	Compliance Report Evidence Items Folder	Email dated 01/08/23
[33]	Not used in this document.		
[34]	Farnborough Air Traffic Procedure Safety Analysis (APSA) LF/25/23 – OCK Removal and RNAV Substitution of Farnborough IAPs APSA	Compliance Report Evidence Items Folder	LF/25/23 dated 06/07/2023
[35]	Farnborough Air Traffic Procedure Safety Analysis (APSA) LF/26/23 - Implementation of RNAV Substitution of Farnborough IAPs	Compliance Report Evidence Items Folder	LF/26/23 dated 06/07/2023
[36]	Farnborough Air Traffic Procedure Safety Analysis (APSA) LF/28/23 – RNAV Substitution of Missed Approach ILS/DME and LOC/DME Y 24	Compliance Report Evidence Items Folder	LF/28/23 dated 12/07/2023
[37]	Farnborough Airport Flight Operations, Performance and Safety Committee Minutes 20 th March 2023 (FLOPSC/LRST)	Compliance Report Evidence Items Folder	20 March 2023