Application for instrument approach procedures to aerodromes without an instrument runway and/or approach control

CAP 1122

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Foreword

Aim

CAP 1122, "Application for Instrument Approach Procedures to Aerodromes without an Instrument Runway and/or Approach Control" is compiled by the Civil Aviation Authority with the aim of promulgating CAA policy for the process of approving the establishment of Instrument Approach Procedures (IAPs) to runways which do not meet instrument runway criteria and/or at certain aerodromes which do not provide an Approach Control service. A cross-CAA working group has evaluated the issues associated with the approval of IAPs where one or more deficit in either aerodrome infrastructure or Air Traffic Service may have previously precluded such promulgation. The objective is therefore to recommend a way forward which would allow wider deployment of IAPs at UK aerodromes whilst providing continuing assurance regarding acceptable levels of safety and utilising to the greatest extent possible current policy.

Context

It must be emphasised that the establishment / notification of IAPs to aerodromes without an instrument runway and/or approach control must be seen as exceptions to the normal standard. The associated processes to approve such an operation will require an applicant to address any deficit using a "risk-based" approach to militate against any safety risks outside of what might be considered normal operations.

In addition to any safety case and specific mitigation associated with an application under this policy, the introduction of a new IAP does not negate the need to follow existing CAA requirements regarding the design of an instrument flight procedure or introduction of an airspace change. Rather, it will complement those requirements.

CAP 785[1] and CAP 725[2] respectively provide CAA guidance on approval requirements for Instrument Flight Procedures and on the application of the Airspace Change Process (ACP). Under CAP 725, within controlled airspace, an ACP is required although the degree of consultation can be scaled depending upon the impact of the change e.g. whether a new IAP replaces or overlays an existing procedure. Outside of controlled airspace, the CAA recommends applicants use the Airspace Change Process as a guide to assist them with developing their proposal. An airspace change proposal may be required depending on the impact the proposed approach will have on the surrounding airspace. More often than not an RNAV(GNSS) approach in Class G airspace will not require an airspace change proposal but this cannot be ruled out as each scenario is unique. These requirements have been reflected in the application process outlined at Section 3 of this document.

It is acknowledged that whilst the CAA has provided guidance on how an applicant might demonstrate compliance with this policy in this Civil Aviation Publication (CAP), the guidance itself may not have addressed every specific circumstance at a given aerodrome and the nature of the operation. Thus, where an applicant requires clarification or additional guidance, advice should be obtained from the CAA as early as possible in the development process using the point of contact identified in the 'Application Process' section at Section 3 Chapter 1 of this document.

The scope of this policy is wide and the CAA therefore intends to move forward in a incremental and measured manner. This CAP therefore represents the first stage of a process which allows safety assurance to be reinforced and validated through experience in measured steps before progressing to the next stage.

Availability

In order to ensure a wide distribution, and to ensure that subsequent amendments and updates are readily available, CAP 1122 is available on-line at www.caa.co.uk/CAP1122. Paper copies are available from the CAA's publishers. Please see inside cover for contact details.

Approval fees

Fees associated with obtaining CAA approval to design Instrument Flight Procedures (IFPs) for use in UK airspace are available from the CAA website at: www.caa.co.uk/ors5.

1 CAP 785 - Approval Requirements for Instrument Flight Procedures for Use in UK Airspace
2 CAP 725 - CAA Guidance on the Application of the Airspace Change Process (ACP)

Abbreviations and glossary

Abbreviations

ABAS	Aircraft based augmentation system
AOM	Aerodrome operating minima
APD	Approved procedure designer
APV	Approach procedure with vertical guidance
ARP	Aerodrome reference point
ATM	Air traffic management
ATS	Air traffic services
Baro-VNAV	Barometric VNAV
BRNAV	Basic area navigation
CAT	Commercial air transport
DA(H)	Decision altitude (height)
DME	Distance measuring equipment
DVOF	Digital vertical obstructions file (MOD)
EASA	European aviation safety agency
EGNOS	European geostationary navigation overlay service
FAF	Final approach fix
GA	General aviation
GBAS	Ground based augmentation system
GNSS	Global navigation satellite system
GPS	Global positioning system
IAC	Instrument approach chart
IAP	Instrument approach procedure
ICAO	International civil aviation organisation
IFP	Instrument flight procedures
ILS	Instrument landing system
IMC	Instrument meteorological conditions
IFR	Instrument flight rules

IR	Instrument rating
LNAV	Lateral navigation
LNAV/VNAV	Lateral navigation with barometric vertical guidance
LPV	Localizer precision with vertical guidance
MDA(H)	Minimum descent altitude (height)
MSA	Minimum sector altitude
MOC	Minimum obstacle clearance
NAVSTAR	Navigation satellite timing and ranging
NDB	Non-directional beacon
NPA	Non-precision approach
MAP	Missed approach
MAPt	Missed Approach Point
OCA(H)	Obstacle clearance altitude (height)
OCH	Obstacle clearance height
PRNAV	Precision area navigation
RNAV	Area navigation
RNP	Required navigation performance
PBN	Performance based navigation
SBAS	Satellite based augmentation system
TAA	Terminal arrival altitude
UK AIP	United Kingdom aeronautical information publication
VOR	Very high frequency omnidirectional radio range
VMC	Visual meteorological conditions
WAAS	Wide area augmentation system

Glossary of terms

PBN: Performance Based Navigation specifies RNAV system performance requirements for aircraft operating along an ATS route, on an instrument flight procedure or in a volume of airspace. Performance requirements are defined in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept. Performance requirements are identified in navigation specifications, which also identify which navigation sensors, and equipment may be used to meet the performance requirement. Therefore performance-based navigation depends on:

- The RNAV system and installation on the aircraft being approved to meet the performance and
- Functional requirements of the navigation specification prescribed for RNAV operations in an airspace; and
- Air crew satisfying the operating requirements set out by the regulator for RNAV operations; and
- A defined airspace concept which includes RNAV operations; and
- An available Navaid infrastructure;
- The following RNAV applications have been introduced in European airspace:
- B-RNAV - is mandatory as the primary means of navigation in all European en-route airspace
- P-RNAV - is the navigation specification that is required for RNAV procedures in Terminal Airspace.
- RNAV (GNSS) Approach - the navigation specification for RNAV approach procedures using GNSS

Area Navigation (RNAV) is a method of navigation, which permits aircraft operation on any desired flight path within the coverage of ground based navigation aids or within the limits of the capability of self-contained aids such as satellites, or a combination of both. An RNAV navigation specification that includes requirements for on-board performance monitoring and alerting is known as an RNP specification. If on-board performance monitoring and alerting is not required, the navigation specification is known as an RNAV specification.

B(asic)-RNAV defines European RNAV operations which satisfy a required track keeping accuracy of ± 5 NM for at least 95% of the flight time. This level of navigation accuracy is comparable with that which can be achieved by conventional navigation techniques on ATC routes defined by VOR/DME, when VORs are less than 100 NM apart

P(recision) RNAV (P-RNAV), or Precision Area Navigation, is defined as RNAV that meets a track keeping accuracy equal to or better than +/- 1 NM for 95% of the flight time. P-RNAV offers the ability to use RNAV functionality in all phases of flight except final approach and missed approach. This allows the routes in the terminal airspace to be defined to best meet the needs of the airport, the air traffic controller and the pilot. This translates into fuel and flight time savings through shorter, more direct routes with simple connections to the en-route structure. This can also result in appropriately segregated arrival and departure streams, thereby reducing the need for radar vectors and hence the workload for both the pilot and the controller.

RNAV (GNSS) approach: A GNSS RNAV approach promulgated by a state and designed in accordance with PANS-OPS Criteria ICAO Doc 8168. Note: - It is this type of approach operation that SARG is seeking to introduce at aerodromes without ATC and/or an instrument runway through CAP1122.

RNP: Required Navigation Performance is defined as "a statement of the navigation performance necessary for operation within a defined airspace". Part of a broader concept called "Performance-based Navigation," RNP is a method of implementing routes and flight paths that differs from previous methods in that not only does it have an associated performance specification that an aircraft must meet before the path can be flown but must also monitor the achieved performance and provide an alert in the event that this fails to meet the specification. It is the monitoring and alerting facility that distinguishes RNP from RNAV from which it developed. RNP equipped aircraft can safely operate routes with less separation than previously required which is significant because it increases the number of aircraft that can safely use a particular airspace and therefore accommodate the increasing demand for air traffic capacity

RNP APCH: RNP AProaCH. An RNP approach defined in the ICAO (PBN) manual. An approach equivalent to the RNAV (GNSS) one.

MDA(H): Minimum descent altitude or minimum descent height. The lowest altitude, in feet amsl, to which descent is authorised on final approach during a non-precision instrument landing (i.e. where no glideslope guidance is given) without visual reference to the runway

DA(H): Decision altitude (DA) or Decision height (DH). A specified altitude or height in the precision approach or approach with vertical guidance at which a missed approach must be initiated if the required visual reference to continue the approach has not been established

Vertical Navigation: A method of navigation, which permits aircraft operation on a vertical flight profile using altimetry sources, external flight path references, or a combination of these.

APV: Approach Procedure with Vertical guidance. An instrument approach procedure, which utilises lateral and vertical guidance, but does not meet the requirements established for precision approach and landing operations.

LPV: Localiser Precision with Vertical guidance.

LPV: approach operation: RNAV GNSS approach operation conducted down to LPV minima.

LPV: approach procedure: RNAV GNSS approach procedure containing LPV minima.

LPV OCA(H): Obstacle clearance altitude (OCA) or obstacle clearance height (OCH). The lowest altitude or the lowest height above the elevation of the relevant runway threshold or the aerodrome elevation, as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

Constellation: Refers to either the specific set of satellites used in calculating positions or all the satellites visible to a GPS receiver at one time.

NAVSTAR: The name given to US DoD GPS satellites. NAVSTAR is an acronym for NAVigation Satellite Timing and Ranging. http://www.essp-sas.eu/

GNSS: Global Navigation Satellite Systems. Generic term for all satellite navigation systems.

GPS: The Global Positioning System is a U.S. space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis, freely available to all. GPS is being used with adequate augmentation, in many States as a positioning source an increasing number of B-RNAV (Basic Area Navigation), NPAs (Non Precision Approaches) and RNAV (Area Navigation) approaches. Note:- The term GPS is increasingly used as colloquial shorthand for GNSS.

WAAS: Wide Area Augmentation System is a FAA funded system of equipment and software that augments GPS across continental North America. WAAS provides a satellite signal for WAAS users to support en-route and precision approach aircraft navigation.

EGNOS: The European Geostationary Navigation Overlay Service is Europe's first venture into satellite navigation. It augments the two military satellite navigation systems now operating, the US GPS and Russian GLONASS systems, and makes them suitable for safety critical applications such as flying. Consisting of three geostationary satellites and a network of ground stations, EGNOS achieves its aim by transmitting a signal containing information on the reliability and accuracy of the positioning signals sent out by GPS and GLONASS. It allows users in Europe and beyond to determine their position to within 2 metres, compared with about 20 metres for GPS and GLONASS alone.

http://www.essp.be/index.php
http://www.esa.int/esaNA/egnos.html

ABAS: Aircraft Based Augmentation System. An augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information available on board the aircraft.

SBAS: Satellite Based Augmentation System. SBAS augments the core satellite constellation by providing ranging, integrity and correction information via geostationary satellites. This system comprises a network of ground reference stations that observe satellites signals, and master stations that process observed data and generate SBAS messages for uplink to the geostationary satellites, which broadcast the SBAS message to the users. e.g. EGNOS & WAAS

GBAS: Ground Based Augmentation System is an augmentation to GNSS that focuses its service on the airport area (approximately a 30 km radius). It broadcasts a correction message via a very high frequency (VHF) radio data link from a ground-based transmitter. GBAS will initially provide support for CAT I Precision Approach operation and ultimately fulfil the extremely high requirements for accuracy, availability, and integrity necessary for Category I, II, and III precision approaches. Current GBAS demonstrated accuracy is less than 1 metre in both the horizontal and vertical axis.

GBAS can support at least four RNP Approach types:

- RNP 0.3 2D RNAV = NPA40
- RNP 0.02/40 CAT I = PA
- RNP 0.3/125 RNAV / VNAV = APV I
- RNP 0.03/50 RNAV / VNAV = APV II

http://www.ecacnav.com/

SECTION 1, GENERAL:

CHAPTER 1
Introduction

Current CAA policy requires that the operator of a UK licensed aerodrome wishing to offer an instrument approach[3] must provide a runway which meets the criteria laid down in CAP 168[4] (i.e. a precision or non-precision 'instrument runway'). A further requirement is that an Approach Control service must be provided to aircraft making an instrument approach to a UK aerodrome. These regulatory requirements have stood the test of time and continue to provide an acceptable level of 'standards-based' protection against the main safety risks associated with making approaches under Instrument Flight Rules (IFR).

Regulatory experience has shown that some local aerodrome environments are unique and there are circumstances where these regulatory requirements are not always the most appropriate means of providing the required degree of safety assurance. For example, in order to accommodate specific requirements, such as the need to support isolated communities served by remote aerodromes with very few movements, some UK commercial aircraft operators have, historically, been granted exceptional CAA approval to use instrument approach procedures[5] commonly referred to as Discrete Instrument Approach Procedures (DIAPs). These DIAPs have been designed solely for use by the individual aircraft operating company, in most cases for the purposes of public transport operations, and are not notified (i.e. published) in the UK Aeronautical Information Publication (AIP). The CAA wishes to address this situation such that only approved procedures will be designed, published and used operationally.

3 Air Navigation Order Article 176 requires that an instrument flight procedure must not be notified (i.e. published) unless it has been designed or approved by the CAA.

4 CAP 168 Licensing of Aerodromes.

5 ICAO Definition of an IAP – a series of predetermined manoeuvres by reference to flight instruments with specified protection from obstacles from the initial approach fix, or where applicable, from the beginning of a defined arrival route, to a point from which a landing can be completed and thereafter, if a landing is not completed, to a position at which holding or en-route obstacle clearance criteria apply

Whereas the deployment of conventional IAPs at aerodromes has traditionally been limited[6] by the associated need for relatively costly ground-based navigation system infrastructure, the availability of satellite-based navigation systems means that IAPs serving smaller and less well-equipped aerodromes are proliferating in other states. At present, the regulatory requirements in the UK only allow satellite-based approaches to be deployed at a small number of UK aerodromes. Using a risk-based approach to safety, the policy described in this document responds to demands from stakeholders to improve safety at those aerodromes where publication of an IAP is not otherwise possible.

6 As of January 2011 only 62 of the 137 licensed UK aerodromes listed in the UKAIP (approx 45%) have a notified IAP. Review of commercial flight guides indicates there are additionally around 300 unlicensed aerodromes, none of which are currently permitted to have an IAP.

SECTION 2, POLICY:

CHAPTER 1

Introduction

Historic policy

Instrument Runways Instrument runways fall into two classes – precision instrument and non-precision instrument. This long-standing distinction is based on the need to facilitate approaches, respectively with both lateral and vertical guidance and with lateral guidance only. Both classes of Instrument Runways have to meet minimum standards for runway strip dimensions, obstacle limitation surfaces, holding points, signs, markings and aeronautical ground lighting. Runways which are required to meet less onerous standards within CAP 168 are known as 'non-instrument' runways. For example the obstacle survey requirements for a non-instrument runway are currently less prescriptive than those required for instrument runways, details of which can be found in CAP 232[7].

Approach Control Currently the Air Navigation Order Article 172 requires an Approach Control service to be provided at UK aerodromes for which there is 'equipment for providing aid for an approach to landing by radio or radar'. At such aerodromes, either within or outside controlled airspace, the Approach Control service provides safety mitigation against, for example, the risk of mid-air collision.

Global Navigation Satellite System-Based Instrument Approaches Global Navigation Satellite System (GNSS) approaches based on use of the NavStar US Global Positioning System (GPS) have been approved for use at a number of UK aerodromes in conformance with a specific set of policy requirements: the aerodrome must be licensed, the GNSS approach must be to an instrument runway, an Approach Control service must be provided, aerodrome survey information must be current and appropriate, the aircraft conducting such an approach must be suitably equipped and the pilot qualified to conduct the flight procedure. RNAV(GNSS) approaches are charted RNAV(GNSS) and currently categorised as follows:

7 CAP 232 - Aerodrome Survey Information.

- Non-precision approaches (NPAs) with lateral only guidance where the minima is published as LNAV OCA(H).
- BaroVNAV, where the vertical advisory is provided by the aircraft's barometric system against a position generated in the aircraft's navigation/flight management system, and where the minima is published as LNAV/VNAV OCA(H).
- SBAS (satellite-based augmentation system) where the vertical guidance is provided against a geometrical path in space rather than a barometric altitude. In Europe the augmentation is provided by EGNOS (European Geostationary Navigation Overlay System), and where the minima is published as LPV OCA(H).
- Approach with vertical guidance (APV); these approaches provide lateral and vertical guidance and where the minima is published as LPV OCA(H).

As both BaroVNAV and SBAS IAPs take account of height loss in the design, a pilot can utilise the published OCA(H) as a decision altitude/height DA(H) rather than a minimum descent altitude MDA(H).

The case for change

The case for change is driven not only by safety considerations but also commercial efficiency. Current policy, combined with the associated costs, renders provision of an IAP outside of the financial reach of many smaller aerodromes. Only a relatively small number of UK aerodromes offer any form of instrument approach. Moreover the ground-based infrastructure required to provide a conventional precision approach means that many aerodromes have opted to provide less costly, and potentially less safe, non-precision approaches based on conventional navigation aids. Furthermore, conventional en-route navigation aids such as Non-Directional Beacon (NDB) and Very high frequency Omnidirectional Radio range (VOR), some of which are also used as aerodrome approach aids, are being phased out. The lower costs associated with use of GNSS technology make it more financially attractive to aerodrome operators, particularly those without conventional navigation aids, who might wish to develop an IAP. This would facilitate continued operations in conditions of reduced visibility and low cloud-base.

Safety benefits come from having increased availability of instrument approach procedures to UK aerodromes. Wider provision of GNSS approaches with vertical guidance also better facilitates the initiatives sponsored by International Civil Aviation Organisation (ICAO) e.g. Assembly Resolution 37-11[8]. A significant

8 ICAO General Assembly Resolution A37-11, Performance-based navigation, global goals.

proportion of Controlled Flight-Into-Terrain (CFIT) accidents occur during non-precision approaches. The joint CAA/Industry CFIT Task Force recently concluded that 'The major factors involved in fatal accidents and serious incidents are circling and non-precision approaches,' and recommended[9] that the CAA 'engages with European Aviation Safety (EASA) / EUROCONTROL / ICAO to increase the rate at which traditional non-precision approaches (NPAs) are replaced by GNSS equivalents'. An IAP approval policy which facilitates the wider deployment of GNSS approaches with vertical guidance is seen as a catalyst for the implementation of this significant safety recommendation.

Experience with the current policy for accepting instrument approaches has shown there are some circumstances where the extant regulatory approach is not the most appropriate means of providing the required degree of safety assurance.

Legal considerations

As a result of an extension to the EC Basic Regulation[10] which was approved in November 2009, the legal jurisdiction of the European Union has been extended to include both ATM and Aerodrome matters. However, a key requirement of the EU Single European Sky regulations is that providers of Air Traffic Services (ATS) are required to provide safety assurance documentation to demonstrate that their services are suitably safe. Although, the true effect of the legal background associated with the extension of EASA responsibilities will not be felt until European Implementing Rules for ATM are developed and progressively pass into law, in the interim, the effect is that it is no longer legally appropriate for the UK to make changes to existing national law, principally the Air Navigation Order, in these areas. The current European rule-making programme for ATM and Aerodromes, however, does not include requirements to address the issue which is reflected in this paper, namely the need for wider deployment of instrument approaches. Moreover, although European Regulations will be universally applicable to ATM, the associated Aerodrome regulations will be more limited as they will apply to 'in scope'[11] UK aerodromes.

9 CFIT Task Force Report 20 May 10. http://lgwmsiis03/caanet2/uploads/1809/documents/CFIT%20Report%20May%202010.doc

10 Regulation (EC) No 216/2008 of 20 Feb 2008, amended by Reg (EC) 1108/2009 24 Nov 2009.

11 Aerodromes which will fall within the scope of EU Certification are limited to those which are open to public use, and which serve CAT, and where operations using instrument approach or departure procedures are provided and have a paved runway of 800 metres or above or which exclusively serve helicopters. Member states may also decide to exempt those aerodromes which handle no more than 10,000 passengers per year and handle no more than 850 cargo movements per year.

Changes to the legal obligations of applicants arising from the policy outlined in this paper would therefore need to be addressed on a case-by-case basis through exemptions approved by the CAA. There are three specific areas of European legislation which may have a direct bearing on applicants for an IAP under the circumstances outlined in this CAP. Firstly, the EASA Basic Regulation[12] as outlined above will have the impact of bringing some aerodromes into the required scope for EASA Certification when they develop an IAP if they are also open to public use, serve Commercial Air Transport (CAT) and have a paved runway of 800 metres or above (or exclusively serve helicopters). It is not, however, anticipated that a large number of potential applicant UK aerodromes will meet all the above criteria. A further European Regulation of relevance is Regulation (EU) 73/2010 dealing with Aeronautical Data Quality and Aeronautical Information Management which applies to aerodromes which have an IAP and would therefore require applicants under the arrangements outlined in this CAP to comply with new European Regulatory requirements in these fields. European legislation being developed for the Licensing of Air Traffic Controllers (ATCOs) links certain ATCO ratings (notably the 'Aerodrome Control Visual (ADV)') explicitly to the provision of 'an air traffic control service to aerodrome traffic at an aerodrome that has no published instrument approach or departure procedures'.

Therefore, as this area is subject to potential future European legislation there will remain a risk that future EC legislation may be developed in a way which is less progressive. Any exemptions granted by the CAA as a result of the policy outlined in this paper will therefore need to be caveated with this risk and applicants will need to take this into account in making their associated business decisions.

12 Basic Regulation (EC)216/2008 modified by (EC)118/2009 12 Ibid. Article 4 paragraph 3a Aerodromes in Scope.

SECTION 2, POLICY:

CHAPTER 2

Required regulatory approach

A more progressive policy requires a change in regulatory approach from one based upon standards to one based on risk. Such an approach requires an applicant to consider the mitigations against risk which are provided by the current standards and to provide safety assurance arguments which are specific to the particular aerodrome and airspace environment showing how the associated risks can be mitigated locally by other means where the current requirements are not achieved.

The instrument runway requirement, for example, includes provisions for markings and lighting which aid visual detection and which together with a protected ‘runway strip’ provide some mitigation of the risk of CFIT and, to a degree, the risk of runway excursions and overruns. Approach Control provides some mitigation of the mid-air collision and other risks.

A ‘safety case’ approach is sufficiently well understood within the industry and guidance material on the conduct of such safety assessments is available to applicants in CAP 760[13]. Guidance on the broad boundaries of what may reasonably be considered in scope for a risk-based approach from applicants in terms of aerodrome licensing status, level of ATS provision, runway facilities, and public transport utilisation is provided later in this document. The approach taken by the CAA is one of adopting a progressive approach using relatively conservative bounds initially with scope for the policy to evolve further in later years.

Such a case-by-case approach offers scope, in certain specific circumstances, where it could be shown that the risks of CFIT, collision on the runway, runway excursion, mid-air collision etc could be managed to an acceptable level of safety where the runway facilities do not meet some or all of the ‘instrument runway’ criteria and/or where Approach Control is not provided. Unlike a process which requires the demonstration of predetermined standards, a risk-based method offers the applicant no guarantee that alternative safety argumentation would be successful until the process had been completed. An equally likely conclusion to the process could be that the most appropriate safety assurance could only be met by providing both runway facilities to instrument standards and Approach Control.

13 CAP760 - Guidance on the Conduct of Hazard Identification, Risk Assessment and the Production of Safety Cases: For Aerodrome Operators and Air Traffic Service Providers

For example, it is considered very unlikely that a cogent safety argument could be made for an IAP to be established which would introduce instrument traffic at a busy aerodrome with an active visual traffic pattern without provision of Approach Control. Conversely, a more persuasive safety case could be made in support of an application for a GNSS-based IAP to a minor aerodrome which is located within the control zone of an adjacent major aerodrome and has only a small number of daily movements. Similar risk-based arguments could be made in other specific circumstances, for example an aerodrome in a remote area with low levels of local traffic.

A risk-based methodology and process is outlined later in this document. It is neither foreseen nor intended that this process should be used to modify arrangements retrospectively at aerodromes where IAPs have been established and which already mitigate safety risks by complying with extant regulations. The guidance provided in this document reflects, for a given requirement, the circumstances under which an effective, alternative mitigation means and/or restrictions may be applied as part of the applicant's safety assessment process.

SECTION 2, POLICY:

CHAPTER 3

Scope of application

Where an applicant seeks to notify an instrument approach which would not terminate on an instrument runway or would not be provided with an Approach Control service, an acceptable safety case will need to be presented to the CAA by the owner of the instrument approach procedure which describes the alternative arrangements which will be put in place to reduce the risk of accident. These safety arrangements will need to mitigate those provisions which are normally provided by the presence of a suitably configured instrument runway and an approach control service namely the risk of CFIT, mid-air collision, collision on the runway, runway excursion and other relevant accident types. Where there are changes to Air Traffic services provided as a result of an accepted safety argument, such changes are to be managed by the service provider in accordance with their Safety Management System (SMS).

The potential scope offered by GNSS for the wider deployment of IAP is recognised as considerable, particularly where augmentation offers vertical guidance, which has been shown to offer safety advantages over the traditional ‘lateral guidance only’ Non Precision Approach (NPA). This scope is wide and the CAA is minded to move ahead in a measured manner, with a staged process which allows safety assurance to be reinforced and validated through experience before moving to the next phase. This is captured in the form of matrices which show scheduled public transport flights and all other flights, for combinations of aerodrome configuration and ATS provision that fall within the scope of the initial implementation of this policy.

Proposed Scope of Revised Policy

Table 1 - Public Transport Operations						
	Approach Control	Aerodrome Instrument	Aerodrome Visual	AFISO	No ATS	
					AGCS	SafetyCom
Licensed Aerodromes						
Instrument Runway	G	A1	A1	A1	R	N/A
Non- Instrument Runway	A1	A1	A1	A1	R	R
Unlicensed Aerodromes						
Non- Instrument Runway*	N/A	N/A	N/A	N/A	R	R

Key:

GREEN – Permitted at present.

AMBER 1 – First stage of risk-based regulatory approach, applications considered on a case-by-case basis subject to safety analysis.

RED – Not normally prepared to consider applications at this stage. Some may be potential areas for future consideration, following experience gained from earlier stages.

* Although it is conceivable that some unlicensed aerodromes may have runways which meet many of the required criteria, the absence of a licence and associated safeguarding activity, means that such runways can not be considered to be ‘instrument runways’. They are therefore depicted only as ‘non-instrument runways’ in the table.

Table 2 – Operations other than Public Transport

	Approach Control	Aerodrome Instrument	Aerodrome Visual	AFISO	No ATS	
					AGCS	SafetyCom
Licensed Aerodromes						
Instrument Runway	G	A1	A1	A1	A1	N/A
Non- Instrument Runway	A1	A1	A1	A1	A1	A1
Unlicensed Aerodromes						
Non- Instrument Runway*	N/A	N/A	N/A	N/A	A2	A2

Key:

GREEN – Permitted at present.

AMBER 1– First stage of risk-based regulatory approach, applications considered on a case-by-case basis subject to safety analysis.

AMBER 2– Second stage of risk-based regulatory approach after first stage is complete, and, when further associated policy has been developed, applications considered on a case–by-case basis subject to safety analysis.

RED – Not normally prepared to consider applications at this stage. Some may be potential areas for future consideration, following experience gained from earlier stage.

* Although it is conceivable that some unlicensed aerodromes may have runways which meet many of the required criteria, the absence of a licence and associated safeguarding activity, means that such runways can not be considered to be 'instrument runways'. They are therefore depicted only as 'non-instrument runways' in the table.

SECTION 2, POLICY:

CHAPTER 4

Legacy issues

As a result of this revised policy and the development of a more progressive risk-based process to deal with applications, it is planned to address the relatively small number of IAPs that exist today under 'non-standard' arrangements. These 'Discrete' IAPs (DIAPs) have operated predominantly in remote locations in the UK for a number of years with some of the procedures effectively 'owned' by the aircraft operators and approved under private conditions of use. It will be necessary for these ownership arrangements to be regularised and for risk-ownership to be transferred to the respective aerodrome operators and the procedures published in the UK AIP with suitable caveats in terms of which operators may use them, as appropriate. The term 'Discrete' will no longer be needed and these procedures will, where it is deemed appropriate, operate as promulgated IAPs accepted under the terms of this revised policy.

Safety assessment of these procedures will have been carried out as part of the initial IAP design/periodic review and, for ATS aspects, will form part of the Air Navigation Service Provider's (ANSP) safety assurance documentation developed in support of European Certification and subsequent CAA oversight. In each case there will be several years operating experience which will be of assistance to the CAA in evaluating the safety arguments developed in support of applications for procedures which fall outside the traditional instrument runway/Approach Control category.

Following adoption of this policy, it will be necessary for a CAA review to be conducted of the safety assessment material associated with the original DIAP development and evaluate the historical safety record of operation of each specific DIAP. In the event that the aerodrome operator or the CAA determines that the material evidence derived in this way for a particular aerodrome provides insufficient safety assurance, additional analysis will need to be carried out in accordance with the process described in this document in order to determine whether operation of the IAP could safely continue.

To avoid imposing significant regulatory burden on the small number of operators of aerodromes for which DIAPs currently exist it is proposed that the CAA should seek to use the process of regularising, accepting and promulgating these IAPs as a 'test case' for the revised CAA policy described earlier in this document. It is believed that considerable collective experience of safe operation of IAPs involving 'non-instrument' runways and/or without Approach Control exists at these locations which can be used in the process of developing updated safety assurance documentation and will provide valuable evidence to CAA assessors.

SECTION 3, IMPLEMENTATION:

CHAPTER 1
The application process

The application process for IAPs at aerodromes falling under the scope of this CAP is based upon that already established for IAP applications and which is described in CAP 785 with two significant variations. Firstly, a 'Preliminary Review' step has been added at an early stage in the process before detailed (and potentially costly) IAP design activity needs to take place. This will provide a degree of business risk reduction and also make provision for the CAA to make an early assessment that a route to an acceptable solution may or may not be available. Secondly, the application must be supported with safety assessment documentation (Safety Case) which the applicant must develop to be satisfied that safety risks will be mitigated using, where applicable, alternatives to the traditional standards-based approach. Guidance on this important aspect is provided in Chapter 2 to this section entitled 'The Assessment and Management of Safety Risk'.

The application and review process is outlined below in the form of a flow chart, as an adaptation of the flow chart currently used for IAP approvals under CAP 785. The CAA will nominate a point of contact that will coordinate the dissemination of material to and from other CAA groups, departments and sections. This facilitates a 'one-stop-shop' and means that the information flow to and from the applicant is managed through a single point rather than disparate departments and sections.

In addition to CAA review activity in connection with IAP applications, the non-standard nature of applications which seek to use a non-instrument runway and/or deploy an IAP without an Approach Control service, are such that the applicant will be required, to carry out a safety assessment and produce safety assurance documentation in support of their application. This will follow the Preliminary Review and happen in parallel with detailed IAP design. Further guidance for applicants is available in CAP 760.

For successful applications, the process will culminate in promulgation of letters of exemption from the ANO 172 requirement for Approach Control, where applicable, and approval of the IAP together, where necessary, with any ANO approvals required for associated new ground-based navigation aids. Where safety assessment suggests that the protection provided by an ATZ of standard dimensions is likely to be required and/or other airspace measures, such as the creation of controlled airspace, will need to be considered, an application will need to be made through CAP 725.

IAPs will be promulgated in the UK AIP, with caveats where appropriate to indicate restriction on use, developed as part of the safety assessment process, such as 'PPR only' or 'for use only by operators approved by the aerodrome operating authority'. Policy for promulgation of IAPs at unlicensed aerodromes (shown as Amber 2 on the tables in Section 2 Chapter 3) is being developed within the CAA. However, it is recognised that a new UK Aeronautical Information Publication (AIP) table will be necessary for any IAPs which are, in future, established at unlicensed aerodromes. A likely outcome of safety analysis of associated airspace risks is that some such approaches should be marked on VFR air navigation charts using the 'feathered arrow' symbology in order that other airspace users may be encouraged to avoid operating in the vicinity of the final approach track. However, a measured 'case-specific' approach will need to be taken to such measures based on considerations of, inter alia, frequency of IAP use, local airspace environment etc, in order to manage the wider risks associated with excessive chart clutter.

Preliminary review phase – preliminary assessment by applicant

An applicant wishing to gain CAA approval to develop an IAP to an aerodrome under the terms of the exceptional policy described in this document shall initiate the process by emailing cap1122coordination@caa.co.uk with details of the planned approach and any supporting material or queries you may have. Please also submit online the form 'Notification of Proposed Design Activity' (Form DAP 1916) provided on the CAA website: http://www.caa.co.uk/DAP1916

Application and CAA Review Process Flow Chart

	Applicant	APD	Nominated CAA Coordinator	DAP Case Officer	ASD	ATSD	FO	CAA Legal
Pre-Design	identifies Non-Standard IAP requirement							
	Organises development meeting	Attends	Attends	Attends	Attends	Attends	Attends	
	↓							
Preliminary Review	Produces Preliminary Assessment in support of application, highlighting where exemptions will be regulated and outlining the alternative safety mitigations which are under consideration for subsequent detailed safety asssessment.	May contribute a/r						
	↳		Coordinates Internal Review	CAA Specialist Departments Does internal review of the detailed safety assessment documentation provide the required assurance that the IAP can be introduced and operated safely?				
				If NO either communicate non-acceptance Indicate where additional safety assurance work would need to be carried out prior to resubmission		If YES Prepare and issue ANO exemptions in preparation for introduction of IAP		
	Business decision - Proceed to Design Phase Y/N	←	Communicate Outcome Of Detailed CAA Review To Applicant					
End of 'Preliminary Review' Stage								
	If Yes →	↓						
	↓	Design process						
	Develop Safety Assessment Documentation (Safety Case) for IAP addressing, in particular, mitigation of risks arising from non-standrad runway and/or ATS environment amd describing in detail how the applicant will, as risk-owner assure safe introduction and operation of IAP Provide to CAA for review and acceptance	↓						
		ground validation process						
		↓						
		referred to applicant						
		↵						

Design and detailed safety assessment	→	Coordinate internal review						
			If no, either communicate non-acceptance indicate where additional safety assurance work would need to be carried out prior to submission				If yes, prepare and issue ANO exemptions in preparation for introduction of IAP	
		Communicate outcome or detailed CA review to applicant						
Post-Design	Does IAP Meet Requirements?							
	↓							
	Validation/Simulator/Flight – Nav DataBase Validation NOTAM							
	↓							
	Are operational requirements met?							
	↓							
	Designs Referred to CAA							
Regulatory	→	→		Coordinate CAA Review and Acceptance Activity	Review Conformance Generate Letter Of Acceptance, ANO Exemptions and, where appropriate, ANO approvals for any associated new ground-based navigation aids.			
	Sponsor to Raise & Submit Form F933 to AIS	←		↵				
Promulgation		→		→	CAA/AIS Chart Production & Integrated Aeronautical Information Package			

SECTION 3, IMPLEMENTATION:

CHAPTER 2

The assessment and management of safety risk

Introduction

An applicant seeking to implement an instrument approach which would not terminate on an instrument runway and/or would not be provided with an Approach Control service, will need to present an acceptable safety case to the CAA which demonstrates that relevant safety risks have been adequately assessed and mitigations put in place to minimise the risk of accident as far as reasonably practicable. In assessing the effectiveness of the proposed alternatives to a runway configured to normal instrument standards and/or to the provision of an Approach Control service the applicant will, as owner of the risk, need to be satisfied that the proposed alternative arrangements will provide a degree of residual risk which is sufficiently low to be acceptable. For established Air Navigation Service Providers (ANSPs) and licensed aerodromes, this will be carried out by means of their Safety Management System (SMS).

The safety assessment by the applicant is a key step toward gaining CAA approval for an IAP to be established under these terms and which will require carefully argued safety assurance documentation to be submitted to the Authority. It is important for potential applicants to bear carefully in mind that, whereas the extant requirements for an instrument runway and an Approach Control service provide clearly observable regulatory standards against which compliance can be demonstrated, the alternatives to these standards which are the subject of this publication, will require a degree of individual and collective judgement to be exercised by both the applicant and the Authority. As such the approval process is, therefore, likely to be iterative and will present a different level of business risk to the applicant. Each applicant will face a different set of local circumstances and the alternative safety arrangements will also vary from one aerodrome location to the next. The applicant's assessment of proposed safety assurance will, therefore, be a most important step.

Some business risk reduction has been built into the application process (described at Section 3 Chapter 1) through the introduction of a Preliminary Review. However, it will be important for applicants to keep in mind that approvals for the establishment of IAP under the arrangements outlined in this publication will be exceptions to the normal standards and will be made on the basis of risk-based judgement. Where the applicant has failed to provide acceptable safety assurance, the CAA will be unable to accept the proposal.

Safety assurance process and documentation

In addition to the normal CAA review activity in support of IAP applications, the non-standard nature of applications which seek to use a non-instrument runway and/or deploy an IAP without an Approach Control service are such that the applicant will be required, following a Preliminary Review and in parallel with detailed IAP design, to carry out a safety assessment and produce Safety Assurance Documentation in support of the application. Further guidance for applicants is available in CAP 760.

Guidance in developing and assessing the merit of alternative safety mitigations which could be considered by applicants and subsequently put forward to the CAA is provided at Annex A which indicates where each part of the existing regulations currently provides mitigation against a specific accident type or types. This Annex is intended to act as a guide to applicants and CAA staff but should not be considered to be the sole means of assessing and reviewing the safety risk associated with proposed alternative arrangements for the establishment of an IAP and the preparation and consideration of the associated safety assurance documentation (safety case).

Post implementation continuing safety assurance

Once an IAP approved under this process has entered operational service, safety assurance activity must continue in the form of a specific 'post implementation review' which is a mandatory part of the risk-reduction process. This will allow lessons to be learnt from the initial operating phase which can be fed into the process for future applications. Post-implementation evaluation will, in any event, form part of routine CAA risk-based oversight activities at licensed aerodromes and certified ANSPs.

ANNEX A

Baseline safety arguments

Goal 1 **The IAP at (aerodrome name) will be operated with an acceptable degree of safety.**						
Strategy 1 Argument that the standards-based approach which requires approach control (iaw ANO Art 172) and a runway equipped to CAP168 'instrument runway' standards when used in combination with other risk-reduction measures, provides an acceptable degree of safety.						
Goal 1.1 The risk of a CFIT accident is acceptably low. (CFIT)	**Goal 1.2** The risk of a runway excursion accident is acceptably low. (REXC)	**Goal 1.3** The risk of a runway collision accident is acceptably low. (RCOLL)	**Goal 1.4** The risk of a mid-air collision accident is acceptably low. (MAC)	**Goal 1.5** The risk of a loss of control accident is acceptably low (LOC)	**Goal 1.6** The risk of an accident during the introduction to service of a new IAP at this aerodrome is acceptably low. (INTRO)	**Goal 1.7** The risk of an accident during the through-life operation of an IAP at this aerodrome is acceptably low. (THRULIFE))

Figure 1: Baseline top level strategy and goals

The table above reflects the safety goals which are satisfied within the extant standards-based approach to the approval of IAPs at UK aerodromes. These and the underpinning safety statements in the table which follows form a baseline which describes the current approach for aerodromes using approach control and a runway meeting CAP 168 'instrument runway' standards.

Baseline Safety Arguments Provided By The Established Standards-Based Approach To IAPs	
The IAP at (aerodrome name) will be operated with an acceptable degree of safety	
Argument that the standards-based approach which requires Approach Control iaw ANO Art 172 and a runway equipped to CAP 168 'instrument runway' standards, when used in combination with other risk-reduction measures provides an acceptable degree of safety.	
Goal 1.1 The risk of a CFIT accident is acceptably low. (CFIT)	
CFIT 1 CAP 168 Instrument Runway Standards are met.	**CFIT 1.1** CAP168 compliant instrument runway strip reduces the risk of a CFIT accident by an inaccurately positioned aircraft in the immediate aerodrome environment through provision of an area free from infrangible obstacles.
	CFIT 1.2 Instrument runway marking and lighting assists crews in visually detecting the runway by day and night and subsequently following an appropriate approach path to touchdown which will keep them clear of terrain and obstacles. In particular Aeronautical Ground Lighting (AGL) provides flight crew with location, orientation and alignment information in adverse visibility conditions and at night.
CFIT 2 ANO 127 Requirement for Approach Control is met	**CFIT 2.1** Approach controller reduces the risk of CFIT by providing accurate Altimeter setting (QNH) instructions and providing a confirmatory check of pilot readback.
	CFIT 2.2 Approach controller reduces the risk of CFIT by providing meteorological information in the form of cloudbase and visibility information.
	CFIT 2.3 Provision of Approach Control with surveillance reduces the risk of CFIT as the Approach Controller assumes some responsibility for terrain safety.
CFIT 3 The Aerodrome is licensed.	**CFIT 3.1** As the aerodrome is licensed, CAP 232 Aerodrome Survey Standards are met and 'safeguarding' applies, both of which reduce the risk of CFIT by providing a 'known' terrain and obstacle environment.
CFIT 4 The IAP design has been conducted iaw PANS OPS and the procedure notified in the UKAIP	**CFIT 4.1** Use of PANS-OPS IAP Design criteria reduces the risk of CFIT by permitting the aircraft to fly to an altitude and position from which either a landing or missed-approach may be flown whilst remaining terrain-safe.
	CFIT 4.2 The established procedures for designing and approving IAP designs (including flight validation procedures) provide participating aircraft with a flightpath which, if followed in flight, will keep them clear of terrain and obstacles.
CFIT 5 The integrity and accuracy of the navigation aids used for the instrument approach meet the required standards.	**CFIT 5.1** The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to avoid flight into terrain or obstacles
CFIT 6 The crew members of participating aircraft are suitably qualified and proficient to safely execute an IAP with sufficient accuracy to remain clear of terrain and obstacles.	**CFIT 6.1** The flight crew training and qualification standards which must be met are sufficient to provide for IAPs to be flown safely and accurately, remaining clear of terrain and obstacles.
CFIT 7 Aerodrome ATS is provided	**CFIT 7.1** Aerodrome ATS reduces the risk of CFIT by providing local meteorological information in the form of cloudbase and visibility information.

Goal 1.2 The risk of a runway excursion accident is acceptably low. (REXC)	
REXC 1 CAP 168 Instrument Runway Standards are met.	**REXC 1.1** CAP 168 compliant Runway Dimensions, Markings, and lighting assist pilots in reducing the risk of runway excursion by enhancing visual determination of runway boundaries and touchdown area, thereby aiding early visual detection and stable approach to safe touchdown in the correct position.
	REXC 1.2 CAP 168 compliant instrument runway strip and Runway End Safety Area (RESA) assist in mitigating the effects should a runway excursion occur.
REXC 2 ANO 172 Requirement for Approach Control is met.	**REXC 2.1** Approach control provides crew with information on runway condition and surface wind info which will assist in reducing the risk of a runway excursion accident.
REXC 3 The IAP design has been conducted iaw PANS OPS and the procedure notified in the UKAIP which, where appropriate, is used as the source data for coding the approaches in navigation databases and brings the required degree of data integrity.	**REXC 3.1** Use of PANS-OPS IAP Design criteria reduces the risk of runway excursion by permitting the aircraft to fly to an altitude and position from which the pilot can decide whether it is either safe to land or may execute a missed approach.
REXC 4 The integrity and accuracy of the navigation aids used for the instrument approach meet the required standards	**REXC 4.1** The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to allow a safe landing to be made on the runway or a safe missed approach to be executed.
REXC 5 The crew members of participating aircraft are suitably qualified and proficient to safely execute an IAP with sufficient accuracy to allow a safe landing to be made on the runway or to execute a safe missed approach	**REXC 5.1** The flight crew training and qualification standards which must be met are sufficient to provide for IAPs to be flown safely and accurately, to a position in space from which a safe landing can be made on the runway or a missed approach can be executed safely.

Goal 1.3 The Risk of a Runway Collision accident is acceptably low (RCOLL)	
RCOLL 1 ANO 172 Requirement for Approach Control is met	**RCOLL 1.1** Approach control provides sequencing of Instrument Approach traffic to reduce the risk of runway collision between participating instrument traffic.
RCOLL 2 CAP 168 Instrument Runway Standards are met.	**RCOLL 2.1** CAP 168 compliant Signage Runway Markings, and lighting assist pilots, aerodrome vehicle drivers and pedestrians in reducing the risk of runway collision by enhancing visual determination of holding points and runway boundaries.
RCOLL 3 Aerodrome ATS is provided	**RCOLL 3.1** Provision of an aerodrome ATS reduces risk of runway collision between instrument and visual traffic.
	RCOLL 3.2 Provision of an aerodrome ATS reduces risk of runway collision between instrument traffic and vehicles/towed aircraft, etc.
	RCOLL 3.3 Provision of an aerodrome ATS and associated runway inspection regime reduces the risk of runway collision between aircraft and foreign objects, including wildlife.
RCOLL 4 The crew members of aircraft participating in the IAP and others using the aerodrome are suitably qualified and proficient to operate safely in the vicinity of the runway	**RCOLL 4.1** The flight crew training and qualification standards which must be met are sufficient to provide for aircraft operations in the vicinity of the runway, including the IAPs, to be conducted safely and minimise the risk of collisions with other aircraft, vehicles, personnel, wildlife or other foreign objects.
Goal 1.4 The Risk of a Mid-Air Collision Accident is acceptably low **(MAC)**	
MAC 1 ANO 172 Requirement for Approach Control is met.	**MAC 1.1** Approach control reduces the risk of mid-air collision between participating instrument traffic by providing separation.
	MAC 1.2 Where the nature and level of traffic requires it, provision of surveillance data allows approach controllers to further reduce the risk of mid-air collision, both between participating traffic and against non-participating traffic.
MAC 2 An aerodrome ATS is provided.	**MAC 2.1** Aerodrome ATC reduces the risk of collision between Instrument Traffic and other known traffic in the aerodrome environment - i.e. by sequencing visual circuit traffic, and providing traffic information on both transiting traffic and infringing traffic which is detected visually.
MAC 3 Airspace design measures are in place in the vicinity of the aerodrome.	**MAC 3.1** An ATZ provides a 'known' environment close to the aerodrome itself which reduces the risk of collision between instrument traffic and non-participating visual traffic.
	MAC 3.2 Where the nature and level of traffic requires it, CAS further reduces the risk of collision between instrument traffic and non-participating visual traffic by providing a known and controlled local air traffic environment which extends further beyond the boundaries of the ATZ.
MAC 4 The aerodrome location and presence of an IAP are depicted in the UK AIP and, where appropriate, on aeronautical charts.	**MAC 4.1** Marking the Aerodrome and instrument approach paths (feathered arrows) on aviation charts assists pilots of non-participating aircraft in avoiding these areas, thereby reducing the risk of mid-air collisions with non-participating traffic.
MAC 5 Visual lookout by aircraft crews and the 'see and avoid principle' provides some protection against mid-air collision during relevant portions of flying an IAP.	**MAC 5.1** During any portion of the procedure where an aircraft flying the IAP is in VMC the 'see and avoid' principle provides a degree of mitigation against the likelihood of collision with other aircraft.

Goal 1.5 The Risk of a Loss Of Control Accident is acceptably low (LOC)	
LOC 1 ANO 172 Requirement for Approach Control is met	**LOC 1.1** Approach control reduces the risk of a loss of control accident arising from Wake Turbulence by sequencing participating instrument approach traffic.
LOC 2 An aerodrome ATS is provided	**LOC 2.1** Aerodrome ATC reduces the risk of a loss of control accident arising from Wake Turbulence by sequencing visual landing traffic and participating instrument approach traffic.
LOC 3 The crew members of aircraft participating in the IAP are suitably qualified and proficient to fly the IAP safely and under control,	**LOC 3.1** The flight crew training and qualification standards which must be met are sufficient to provide for IAPs to be flown safely and accurately, with appropriate training/awareness of wake turbulence considerations.
Goal 1.6 The risk of an accident during the introduction to service of a new IAP at this aerodrome is acceptably low. (INTRO)	
INTRO 1 A formal approval process is followed for the introduction into service of an IAP which ensures that all associated activities needed for safe introduction, such as the publication of aeronautical information, etc have been satisfactorily completed before the IAP can be used operationally. (CAP 785 refers.)	
Goal 1.7 The risk of an accident during the through-life operation of an IAP at this aerodrome is acceptably low. (THRULIFE)	
THRULIFE 1 A formal process is followed for the ongoing maintenance, review and safeguarding of an IAP which requires that changes to airspace structure, survey data and magnetic variation etc are taken into account, that records are kept by the aerodrome owner and a full review is undertaken at 5 yearly intervals (CAP 785 refers).	

The above baseline provides a structure which is intended to give guidance to applicants in developing effective risk-based alternative safety arguments for presentation as part of their application for IAP under the policy outlined in this document. It will also assist CAA staff in their task of reviewing safety arguments in support of applications. It is not the intention of this document to provide guidance on the conduct of the required safety assessment itself: this should be done in accordance with the processes and procedures documented in the applicant's SMS where provided. Further guidance in the form of candidate alternative safety arguments is provided at Annex B to this chapter.

ANNEX B

Candidate alternative safety arguments

<table>
<tr><th colspan="3">The IAP at (aerodrome name) will be operated with an acceptable degree of safety</th></tr>
<tr><td>Argument that the standards-based approach which requires Approach Control iaw ANO Art 172 and a runway equipped to CAP 168 ‘instrument runway’ standards, when used in combination with other risk-reduction measures provides an acceptable degree of safety</td><td colspan="2">Argument that the provision of approach control iaw ANO Art 172 and/or a runway equipped to full CAP 168 ‘instrument runway’ standards would not be reasonably practicable in this case and that alternative solutions will be used in conjunction with other risk-reduction measures to provide an acceptable degree of safety.</td></tr>
<tr><td rowspan="2">Baseline</td><td>Argument that the provision of Approach Control iaw ANO Art 172 and/or a CAP 168 standard ‘instrument runway’ would not be reasonably practicable in this case.</td><td>Argument that alternative solutions will be used in combination with other risk-based measures to provide an acceptable degree of safety.</td></tr>
<tr><td colspan="2">Alternative Safety Arguments</td></tr>
</table>

Figure 2: Candidate alternative safety argument structure

In developing the safety case for the introduction of an IAP, under circumstances where it is proposed that Approach Control is not to be provided and/or where the runway does not meet Instrument Runway criteria, applicants may be guided by CAP 760 in conjunction with the alternative structure outlined in this Appendix. In particular, although no detailed Strategy is outlined which suggests positive safety benefit for introducing an IAP at a specific location (as opposed to commercial or other benefits which might form part of a business case), applicants should bear in mind the need to include, where it is appropriate, safety arguments which arise during assessment which would add to the positive case for introduction of an IAP at this location.

The following tables provide guidance on the scope of alternative safety arguments which could be developed by an applicant and submitted for consideration by the Authority in support of an application for an IAP. These are intended to show where it is believed that scope may exist at some locations for safety objectives to be met using alternative arrangements to the existing standards-based approach involving the provision of an approach control service in accordance with ANO Article 172 and/or a runway which meets the required CAP 168 'instrument runway' standards. These are shown in shaded text to the right of the baseline safety description. **It is emphatically not the Authority's intention to provide a template which could merely be reproduced.** The table is intended to provide guidance on the scope and scale of alternative safety arrangements which could be considered by applicants in support of their own safety analysis and decision whether to proceed with such an application. Applicants are reminded that the candidate alternative safety arguments illustrated in this document will not be universally applicable and their suitability at a local level must be the subject of detailed safety assessment by applicants before considering whether an application should be submitted to the Authority.

This section is intended to assist with this process and the applicant's subsequent development of the safety assessment documentation (e.g. safety case) which must be submitted in support of an application. However, in documenting the existing safety baseline in this way, applicants will be able to present safety evidence which is focussed on the areas of operation which represent alternative safety mitigation to that provided by the current standards-based approach. Where, for example, an application is based upon an aerodrome which has a runway which already meets the required 'instrument' standards but is in an airspace location and/or traffic environment where the applicant judges that the safety risks can be effectively managed without providing an approach control service, the safety mitigations provided by an approach control service are outlined in chapter so they can be used as a baseline from which the more detailed local safety arguments can be developed by applicants. This chapter will be used by Authority staff in the various specialist departments dealing with aircraft operations, aerodrome and air traffic standards, airspace policy etc conducting the review and acceptance process for IAP applications of this kind.

Alt 2.1 Argument that the provision of Approach Control iaw ANO Art 172 would not be reasonably practicable in this case		
Alt 2.1.1 Low Intensity aerodrome and local airspace activity	Alt 2.1.2 Low and managed utilisation of IAP	Alt 2.1.3 Point In Space IAP (PINS)

Alt 2.1 Argument that the provision of Approach Control iaw ANO 172 would not be reasonably practicable in this case
Alt 2.1.1 An argument that the low intensity and nature of aircraft movements in the vicinity of this aerodrome coupled with the levels of traffic and local airspace environment are such that the risks at this location will be reduced to a level which is As Low As Reasonably Practicable (ALARP) without the provision of Approach Control.
Alt 2.1.2 An argument that the relatively low number of users of the IAP will be managed effectively in a different way such as by the restriction of use to certain nominated users and/or by imposition of allocated slot times linked to some form of Prior Permission Required (PPR) requirement managed by the aerodrome operator and combined with other appropriate and effective risk control measures. Arguments for the use of such measures would be expected to show convincing evidence concerning documentation, procedures and regular review for continued suitability together with arguments about the training needs of staff and how these will be satisfied.
Alt 2.1.3 An argument that the provision of approach control would be inappropriate as the type of IAP to be provided is a helicopter Point In Space (PINS) approach which is not linked to an aerodrome.

Alt 2.2 Argument that the provision of an Instrument Runway equipped to full CAP168 standards would not be reasonably practicable in this case		
Alt 2.2.1 Low intensity and nature of aerodrome activity	Alt 2.2.2 Impracticable due to aerodrome physical features	Alt 2.2.3 Point In Space IAP (PINS)

Alt 2.2 Argument that the provision of an instrument runway equipped to full CAP 168 Standards would not be reasonably practicable in this case.
Alt 2.2.1 An argument that the low intensity and nature of aircraft movements at this aerodrome are such that the risks at this location will be reduced to a level which is As Low As Reasonably Practicable (ALARP) without the provision of some of the CAP 168 requirements for an instrument runway.
Alt 2.2.2 An argument that the physical features of this aerodrome are such that provision of some of the CAP 168 requirements for an instrument runway would be impracticable. (e.g. Grass or sand runways.)
Alt 2.2.3 An argument that the provision of an instrument runway would be inappropriate as the type of IAP to be provided is a helicopter Point In Space (PINS) approach which is not linked to an aerodrome.

Argument that alternative solutions will be used in combination with other risk-based measures to provide an acceptable degree of safety.						
Goal 1.1 The risk of a CFIT accident is acceptably low. (CFIT)	**Goal 1.2** The risk of a runway excursion accident is acceptably low. (REXC)	**Goal 1.3** The risk of a runway collision accident is acceptably low. (RCOLL	**Goal 1.4** The risk of a mid-air collision accident is acceptably low. (MAC)	**Goal 1.5** The risk of a loss of control accident is acceptably low (LOC)	**Goal 1.6** The risk of an accident during the introduction to service of a new IAP at this aerodrome is acceptably low. (INTRO)	**Goal 1.7** The risk of an accident during the through-life operation of an IAP at this aerodrome is acceptably low. (THRULIFE)

Goal 1.1 The Risk of a CFIT accident is acceptably low. (CFIT)	
	CFIT 1 CAP168 Instrument Runway standards are met.
	CFIT 2 ANO Art 172 requirement for Approach Control is met.
	CFIT 3 The Aerodrome is licensed.
	CFIT4 The IAP design has been conducted iaw PANS OPS and the procedure notified in the UKAIP which, where appropriate, is used as the source data for coding the approaches in navigation databases and brings the required degree of data integrity.
	CFIT 5 The integrity and accuracy of the navigation aids used for the instrument approach meet the required standards.
	CFIT 6 The crew members of participating aircraft are suitably qualified and proficient to safely execute an IAP with sufficient accuracy to remain clear of terrain and obstacles.
	CFIT 7 An Aerodrome ATS is provided.

Safety Baseline	Candidate Alternative Safety Arguments
Goal 1.1 The Risk of a CFIT accident is acceptably low (CFIT)	
CFIT 1 CAP 168 Instrument Runway Standards are met.	
CFIT 1.1 CAP 168 compliant runway strip reduces the risk of a CFIT accident by an inaccurately positioned aircraft in the immediate aerodrome environment through provision of an area free from infrangible obstacles.	**CFIT 1.1.1 Runway Strip – Higher Minima.** An argument for a reduction in the size of the runway strip provided could be made on the basis of an associated increase in aerodrome operating minima.
	CFIT 1.1.2 Runway Strip - Restrictions on Use. An argument could be made that safety mitigation could be claimed for a reduced runway strip on the basis that use of the IAP was promulgated for specific operators only or by some form of PPR requiring specific briefing on these local limitations. Where this is the case, evidence should be available that operators have been consulted and that the operation of specific a/c categories, or by pilots with particular qualifications and experience provides the necessary safety mitigation
	CFIT 1.1.3 Runway Strip – Use of IAP with Higher Minima. An argument could be made for an 'IAP with Higher Minima' type of approach (as described at Appendix 1) to be used for an aerodrome without a runway strip which fully meets the required CAP 168 standard. Use of this type of IAP coupled with increases in aerodrome operating minima would make it more likely that a safety argument could be made which would be acceptable to the Authority. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
CFIT 1.2 Instrument runway marking and lighting assists crews in visually acquiring the runway by day and night and subsequently following an appropriate approach path to touchdown which will keep them clear of terrain and obstacles. In particular Aeronautical Ground Lighting (AGL) provides flight crew with location, orientation and alignment information in adverse visibility conditions and at night.	CFIT 1.2.1 Aerodrome Lighting - Day Use Only. An argument could be made for a lower standard of lighting to be provided on the basis that the IAP will be promulgated for use during day operations only and published as such in the UK AIP and associated approach plate. Arguments would need to focus upon the types of operations to be supported and the potential for new technology lighting to be considered where appropriate. This type of argument could be used to justify the absence of an aerodrome beacon or provision of a less sophisticated type of aerodrome beacon. It also recognises that low intensity lighting is of only limited use in daylight although arguments would need to reflect the value of lighting in poor visibility conditions. Arguments could also be constructed around the use of visual approach slope indicators which can aid visual perception of the approach path to the runway.
	CFIT 1.2.2 Aerodrome Lighting – Higher Minima. An argument could be made for a reduction in the scale of AD lighting on the basis of an associated increase in aerodrome operating minima.
	CFIT 1.2.3 Runway Marking – Higher Minima. Arguments for a reduction in the scale of runway marking could be made on the basis of an associated increase in procedure minima for visibility and published MDA/DA. This may be particularly applicable to runways with grass or natural surfaces. Arguments could, for example, also be made here for the permanent use of suitable black & white boards for use where threshold is not conspicuous as described in CAP 168 Chapter 7.
	CFIT 1.2.4 Runway Marking and Lighting Standards – Variations. Arguments could be constructed for variations from the standard of runway marking and lighting required for 'precision' and 'non-precision' operations by CAP 168. Such arguments could be constructed around the specific benefits of the aerodrome and procedure. Such arguments would be strengthened by proposed deployment of lighting installations such as (A)PAPI which can provide specific additional benefit in visually acquiring the aerodrome. Arguments which included the deployment of visual approach aids and an associated survey/checking regime would carry additional weight.
	CFIT 1.2.5 Runway Lighting and Marking Standards - Type of IAP. Arguments could be made for provision of a reduced form of AD lighting and/or runway marking on the basis that the IAP would be some form of 'IAP with Higher Minima' procedure as described at Appendix 1. Such arguments could be used to support the use of a visual runway with lighting appropriate to its purely visual day use (or no lighting). Where this type of IAP is used an argument could be made for use at night using AGL which conformed to CAP 168 standards for night VFR operations. Arguments which included the deployment of visual approach aids and an associated survey/checking regime would carry additional weight. However, much higher minima would be required and the utility of the IAP in poor visibility and/or low cloud conditions would be more limited operationally than for other types of IAP. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
	CFIT 1.2.6 Runway Lighting and Marking - Restrictions on Use. An argument could be made that safety mitigation could be claimed for a reduced form of runway marking and/or lighting on the basis that use of the IAP was promulgated for specific operators only or by some form of Prior Permission Required (PPR) requiring specific briefing on these local limitations. This type of argument would be more applicable to the small privately-owned aerodrome or airstrip with only a single operator or small number of users. Note 1: A particular consideration with the evaluation of all the above arguments in the context of the CFIT risk would be the type of local topography. Note 2: In each case, safety arguments for variations from the CAP 168 standard would need to be much more strongly justified where Pubic Transport operations are contemplated.
CFIT 2 ANO 172 Requirement for Approach Control is met.	
CFIT 2.1 Approach controller reduces the risk of CFIT by providing accurate Altimeter setting (QNH) instructions and providing a confirmatory check of pilot readback.	CFIT 2.1.1 Altimeter Setting – ATSU. Where use of the IAP involves initial contact by the aircraft commander with an ATSU (in the absence of Approach Control), and local procedures involve direct communication between the ATSU and aerodrome, an argument could be made that the altimeter setting instructions and associated readback could be provided by that ATSU. Where the aerodrome met observation equipment does not meet ICAO standards, the derived pressure settings may need to be relayed as 'advisory QNH'.
	CFIT 2.1.2 Altimeter Setting – Aerodrome ATS. Where an aerodrome ATS is provided, in the absence of approach control, an argument could be made that the altimeter setting instructions and associated readback could still be provided by the controller or AFISO. The basis of such an argument could be that this provides an equivalent level of risk (in this case of passing an incorrect pressure setting) to that provided at aerodromes where the duties of approach and aerodrome controller are periodically discharged by a single individual. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
	CFIT 2.1.3 Altimeter Setting - Aerodrome With AGCS. Where only AGCS is provided, and in the absence of an approach control service, or an initial service from a neighbouring ATSU, an argument could be made on the basis that an 'advisory' altimeter settings is provided to the aircraft commander by the AGCS operator. Such arguments could be strengthened by the use of ICAO compliant meteorological equipment, however, the more limited qualification and privileges of the AGCS operator would mean that additional mitigation is likely to be needed in the form of the use of higher minima for an IAP. Where an IAP with Higher Minima type of approach, as described at Appendix 1, is to be used, an argument could be made that the use of an advisory pressure setting provided by an AGCS operator could be acceptable on the basis that with this type of approach the use of more conservative aerodrome operating minima would leave an adequate safety margin.
	CFIT 2.1.4 Altimeter Setting - Aerodrome with neither ATS nor AGCS. Where no aerodrome ATS or AGCS is provided (for example at a private landing strip, or an 'unmanned' aerodrome where SafetyCom is used by joining and departing aircraft), arguments could be made about the use of a QNH obtained by the aircraft commander from a nearby aerodrome which is able to generate altimeter settings based upon ICAO compliant equipment. This method would provide the required readback which would provide some mitigation against pilot error – and it should be noted that an argument based purely upon the use of Volmet or neighbouring ATIS broadcasts would be less likely to provide the required degree of safety assurance as it would lack this safety mitigation. An argument based upon use of a Regional Pressure Setting (RPS) obtained, with readback, from an ATSU (such as London or Scottish Information) could be considered where no suitable adjacent aerodrome QNH is available – on the basis that the RPS would provide a 'lowest forecast' setting and would therefore provide some further CFIT mitigation. The local airspace environment would, however, need to be considered particularly where such an approach might increase the risk of a vertical infringement of CAS. Such arguments would again carry more weight if used in the context of a type of IAP higher minima as outlined at Appendix 1. The distance between the adjacent aerodrome and the IAP location would be of relevance and local topography would also need to be addressed in any such safety argument.
	CFIT 2.1.5 Altimeter Setting - Aerodrome with neither ATS nor AGCS – Use of Ground Observer. An argument could be made on the basis that an altimeter setting could be provided at such locations by an observer on the ground with suitable equipment and ground to air communications. Such arrangements could be argued to provide the mitigating readback and would be strengthened by the use of ICAO compliant meteorological observation equipment. The ground observer would need to be qualified to use the radio equipment and a suitable Ground-Air radio frequency would need to be procured. The qualification status of the ground observer and 'advisory' nature of pressure settings obtained using equipment which did not meet ICAO standards would need to be reflected in higher minima for the approach. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
	CFIT 2.1.6 Altimeter Setting - Aerodrome with neither ATS nor AGCS – Use of Remote Observation and Reporting Equipment. It is possible that a safety argument could be constructed around the use of remote meteorological reporting equipment. Such equipment is deployed in other parts of the world, notably the USA, where it is known as AWOS (Automated Weather Observation System) and ASOS (Automated Surface Observation System). However, in this context the equipment forms part of a networked national infrastructure. There are no plans to introduce such an infrastructure in UK and an applicant would, therefore, need to address a range of communications and organisational factors if considering deploying such equipment as part of a solution supporting an IAP. The procurement costs associated with such equipment would also be a significant consideration. It is therefore recommended that any application which is to be based upon the use of remote observation and reporting equipment as part of the safety argument should be discussed with the CAA at the very earliest stage.
CFIT 2.1 Approach controller reduces the risk of CFIT by providing accurate Altimeter setting (QNH) instructions and providing a confirmatory check of pilot readback.	CFIT 2.1.1 Altimeter Setting – ATSU. Where use of the IAP involves initial contact by the aircraft commander with an ATSU (in the absence of Approach Control), and local procedures involve direct communication between the ATSU and aerodrome, an argument could be made that the altimeter setting instructions and associated readback could be provided by that ATSU. Where the aerodrome met observation equipment does not meet ICAO standards, the derived pressure settings may need to be relayed as 'advisory QNH'.
	CFIT 2.1.2 Altimeter Setting – Aerodrome ATS. Where an aerodrome ATS is provided, in the absence of approach control, an argument could be made that the altimeter setting instructions and associated readback could still be provided by the controller or AFISO. The basis of such an argument could be that this provides an equivalent level of risk (in this case of passing an incorrect pressure setting) to that provided at aerodromes where the duties of approach and aerodrome controller are periodically discharged by a single individual.
	CFIT 2.1.3 Altimeter Setting - Aerodrome With AGCS. Where only AGCS is provided, and in the absence of an approach control service, or an initial service from a neighbouring ATSU, an argument could be made on the basis that an 'advisory' altimeter settings is provided to the aircraft commander by the AGCS operator. Such arguments could be strengthened by the use of ICAO compliant meteorological equipment, however, the more limited qualification and privileges of the AGCS operator would mean that additional mitigation is likely to be needed in the form of the use of higher minima for an IAP. Where an IAP with Higher Minima type of approach, as described at Appendix 1, is to be used, an argument could be made that the use of an advisory pressure setting provided by an AGCS operator could be acceptable on the basis that with this type of approach the use of more conservative aerodrome operating minima would leave an adequate safety margin. continued overlef

Safety Baseline	Candidate Alternative Safety Arguments
	CFIT 2.1.4 Altimeter Setting - Aerodrome with neither ATS nor AGCS. Where no aerodrome ATS or AGCS is provided (for example at a private landing strip, or an 'unmanned' aerodrome where SafetyCom is used by joining and departing aircraft), arguments could be made about the use of a QNH obtained by the aircraft commander from a nearby aerodrome which is able to generate altimeter settings based upon ICAO compliant equipment. This method would provide the required readback which would provide some mitigation against pilot error – and it should be noted that an argument based purely upon the use of Volmet or neighbouring ATIS broadcasts would be less likely to provide the required degree of safety assurance as it would lack this safety mitigation. An argument based upon use of a Regional Pressure Setting (RPS) obtained, with readback, from an ATSU (such as London or Scottish Information) could be considered where no suitable adjacent aerodrome QNH is available – on the basis that the RPS would provide a 'lowest forecast' setting and would therefore provide some further CFIT mitigation. The local airspace environment would, however, need to be considered particularly where such an approach might increase the risk of a vertical infringement of CAS. Such arguments would again carry more weight if used in the context of a type of IAP higher minima as outlined at Appendix 1. The distance between the adjacent aerodrome and the IAP location would be of relevance and local topography would also need to be addressed in any such safety argument.
	CFIT 2.1.5 Altimeter Setting - Aerodrome with neither ATS nor AGCS – Use of Ground Observer. An argument could be made on the basis that an altimeter setting could be provided at such locations by an observer on the ground with suitable equipment and ground to air communications. Such arrangements could be argued to provide the mitigating readback and would be strengthened by the use of ICAO compliant meteorological observation equipment. The ground observer would need to be qualified to use the radio equipment and a suitable Ground-Air radio frequency would need to be procured. The qualification status of the ground observer and 'advisory' nature of pressure settings obtained using equipment which did not meet ICAO standards would need to be reflected in higher minima for the approach.
	CFIT 2.1.6 Altimeter Setting - Aerodrome with neither ATS nor AGCS – Use of Remote Observation and Reporting Equipment. It is possible that a safety argument could be constructed around the use of remote meteorological reporting equipment. Such equipment is deployed in other parts of the world, notably the USA, where it is known as AWOS (Automated Weather Observation System) and ASOS (Automated Surface Observation System). However, in this context the equipment forms part of a networked national infrastructure. There are no plans to introduce such an infrastructure in UK and an applicant would, therefore, need to address a range of communications and organisational factors if considering deploying such equipment as part of a solution supporting an IAP. The procurement costs associated with such equipment would also be a significant consideration. It is therefore recommended that any application which is to be based upon the use of remote observation and reporting equipment as part of the safety argument should be discussed with the CAA at the very earliest stage. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
CFIT 2.2 Approach controller reduces the risk of CFIT by providing meteorological information in the form of cloudbase and visibility information.	CFIT 2.2.1 Weather Reporting – ATSU. Where use of the IAP involves initial contact by the aircraft commander with an ATSU (in the absence of Approach Control), and local procedures involve direct communication between the ATSU and aerodrome, an argument could be made that the aerodrome weather information (principally cloudbase and visibility) could be provided by that ATSU. Where the aerodrome met observation equipment does not meet ICAO standards, the weather observations may need to be relayed as 'unofficial observed weather'. This and other alternative safety arguments which involve actions by other parties, such as an adjacent ATSU, would need to be supported by supporting arguments relating to associated Letters of Agreement, training provision, licensing arrangements, MATS Part 2 and SMS provision etc. CFIT 2.2.2 Weather Reporting – Aerodrome ATS or AGCS. Where an aerodrome ATS or AGCS is provided, in the absence of approach control, an argument could be made that the aerodrome weather information (as an 'unofficial observation' if necessary) could still be provided by the controller or AFISO/AGCS operator. The basis of such an argument could be that this provides an equivalent level of risk (in this case of passing incorrect weather information) to that provided at aerodromes where the duties of approach and aerodrome controller are periodically discharged by a single individual. CFIT 2.2.3 Weather Reporting - Aerodrome with neither ATS nor AGCS. Where no aerodrome ATS or AGCS is provided (for example at a private landing strip, or an 'unmanned' aerodrome where SafetyCom is used by joining and departing aircraft), arguments could be made about the use of local weather information from a ground observer, or a nearby aerodrome, if appropriate, using Volmet or ATIS broadcasts. A ground observer would need to be qualified to use the radio equipment and a suitable Ground-Air radio frequency may need to be procured.
CFIT 2.3 Provision of Approach Control with surveillance reduces the risk of CFIT as the Approach Controller assumes some responsibility for terrain safety.	CFIT 2.3.1 Requirement for Monitoring of Lateral and Vertical Flight Path – Type of Operation. An argument would need to be made to justify the absence of capability to monitor the vertical and lateral flight path. This capability provides some additional mitigation against the risk of altimeter setting error and navigation lateral errors. Such an argument could be based upon the type of operation for which the IAP is to be deployed. A number of UK aerodromes operate approach control which is not based on surveillance services, although the approach controller is able to allocate terrain safe levels the degree of safety mitigation with respect to CFIT provided to aircraft using the IAP is different. An equivalence argument could therefore be appropriate here. continued overleaf

Safety Baseline	**Candidate Alternative Safety Arguments**
CFIT 3 The Aerodrome is licensed.	
CFIT 3.1 As the aerodrome is licensed, CAP 232 Aerodrome Survey Standards are met and 'safeguarding' applies, both of which reduce the risk of CFIT by providing a 'known' terrain and obstacle environment.	CFIT 3.1.1 Aerodrome Surveys – Data from other Sources. Where an instrument approach designer is able to gain access to compressive terrain and obstacle data from sources other than the aerodrome survey then an argument could be made that, with suitable increases in minimum obstacle clearance values, this would constitute an acceptable level of design information for this purpose.
CFIT 4 The IAP design has been conducted iaw PANS OPS and the procedure notified in the UK AIP which, where appropriate, is used as the source data for coding the approaches in navigation databases and brings the required degree of data integrity.	
CFIT 4.1 Use of PANS-OPS IAP Design criteria reduces the risk of CFIT by permitting the aircraft to fly to an altitude and position from which either a landing or missed approach may be flown whilst remaining terrain-safe.	CFIT 4.1.1 Use of IAP with Higher Minima. An argument could be made by an applicant for an IAP with Higher Minima to be designed and make use of more conservative aerodrome operating minima. This would, for example, reduce the cost associated with the level of associated CAP 232 obstacle survey. The Authority would be prepared to consider safety arguments from an approved IAP design organisation for construction of an IAP with higher minima using the process described at Appendix 1. An adequate means of periodic review of continued accuracy of the AIP and associated aerodrome data would need to be developed and provided by the applicant in support of such arguments.
CFIT 4.2 The established procedures for designing and approving IAP designs provide participating aircraft with a flightpath which, if followed in flight, will keep them clear of terrain and obstacles.	CFIT 4.2.1 Use of IAP with Higher Minima – Aircraft Category Limitation. An argument for the use of an IAP with Higher Minima as highlighted above would be dependent upon limiting the use of the procedure to aircraft within the lower speed categories A,B or H, and under additional limiting conditions such as those outlined at Appendix 1. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
CFIT 5 The integrity and accuracy of the navigation aids used for the instrument approach meet the required standards.	
CFIT 5.1 The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to avoid flight into terrain or obstacles.	CFIT 5.1.1 The integrity of navigation aids is a measure of the reliance that can be put on the aid in radiating a correct signal. The integrity depends on the ability of the aid to radiate an in tolerance signal and also of the inbuilt monitoring systems to recognise when the signal is out of tolerance and shutdown the faulty system. The integrity of ground based navigation aids is assessed when the aid is first approved for use, with manufacturers evidence of reliability of all parts of the system being taken into account. The ongoing reliability of those parts of the system will give confidence that the integrity requirements continue to be met. Cross checking of Other Sources of Information by Aircraft Commander. As a mitigation for rare integrity failures, when systems radiate incorrect information, Pilots will cross check other systems to give confidence that all is as it should be or to alert them that there is a problem with the guidance being used. For example a pilot making an ILS approach will check the height of the aircraft at a certain DME range to be sure the glide path information is correct. CFIT 5.1.3 GPS has no internal monitoring system to give timely warning of incorrect guidance being transmitted, instead Integrity monitoring relies on augmentations such as the use of receivers equipped with RAIM (Receiver Autonomous Integrity Monitoring). In lieu of manufacturers evidence to support the approval of an approach using GPS guidance, CAA makes available historical monitoring data to allow the assessment of the integrity in conjunction with the certified reliability of the RAIM algorithm. Note that Pilot cross checks as above are still required to mitigate against integrity failures in the system
CFIT 6 The crew members of participating aircraft are suitably qualified and proficient to safely execute an IAP with sufficient accuracy to remain clear of terrain and obstacles.	
CFIT 6.1 The flight crew training and qualification standards which must be met are sufficient to provide for IAPs to be flown safely and accurately, remaining clear of terrain and obstacles.	No alternative safety argument is considered appropriate for this baseline safety solution.

Safety Baseline	Candidate Alternative Safety Arguments
CFIT 7 An Aerodrome ATS is provided	
CFIT 7.1 Aerodrome ATS reduces the risk of CFIT by providing local meteorological information in the form of cloudbase and visibility information.	CFIT 7.1.1 Weather Reporting – Aerodrome ATS. Where an aerodrome ATS is provided, in the absence of approach control, an argument could be made that the aerodrome weather information could still be provided by the controller or AFISO. The basis of such an argument could be that this provides an equivalent level of risk (in this case of passing incorrect weather information) to that provided at aerodromes where the duties of approach and aerodrome controller are periodically discharged by a single individual.
	CFIT 7.1.2 Weather Reporting - Aerodrome with AGCS. Where only AGCS is provided, and in the absence of an approach control service, or an initial service from a neighbouring ATSU, an argument could be made that 'unofficial weather observations' could be provided to the aircraft commander by the AGCS operator. Such arguments could be strengthened by the use of ICAO compliant meteorological equipment, however, the more limited qualification and privileges of the AGCS operator would mean that additional mitigation is likely to be needed in the form of the use of higher minima for an IAP. Where an IAP with Higher Minima type of approach, as described at Appendix 1, is to be used, an argument could be made that the use of an unofficial weather observation provided by an AGCS operator could be acceptable on the basis that with this type of approach more conservative aerodrome operating minima would be applied which would leave an adequate safety margin.
	CFIT 7.1.3 Weather Reporting - Aerodrome with neither ATS nor AGCS. Where no aerodrome ATS or AGCS is provided (for example at a private landing strip, or an 'unmanned' aerodrome where SafetyCom is used by joining and departing aircraft), arguments could be made about the use of local weather information obtained by the aircraft commander from a nearby aerodrome which is able to generate meteorological reports based upon ICAO compliant equipment. An argument at some locations could also be based upon the use of Volmet or neighbouring ATIS broadcasts. Such arguments would again carry more weight if used in the context of an IAP with Higher Minima approach as outlined at Appendix 1 or with suitably conservative aerodrome operating minima. The distance between the adjacent aerodrome and the IAP location would be of relevance as in certain meteorological conditions there can be significant variations in local conditions between neighbouring observation points. Local topography would also need to be addressed in any such safety argument.
	CFIT 7.1.4 Weather Reporting - Aerodrome with neither ATS nor AGCS – Use Of Ground Observer. An argument could be made on the basis that a local weather report could be provided at such locations by an observer on the ground with suitable equipment and ground to air communications. Such arrangements would be strengthened by the use of ICAO compliant meteorological observation equipment. The ground observer would need to be qualified to use the meteorological equipment to provide observations and associated radio. A suitable Ground-Air radio frequency would also need to be procured. The qualification status of the ground observer and 'advisory' nature of pressure settings obtained using equipment which did not meet ICAO standards would need to be reflected in suitably conservative aerodrome operating minima associated with the use of an IAP with Higher Minima as outlined at Appendix 1.

Goal 1.2 The Risk of a Runway Excursion accident is acceptably low. (REXC)	
	REXC 1 CAP168 Instrument Runway standards are met.
	REXC 2 ANO Art 172 requirement for Approach Control is met.
	REXC 3 The IAP design has been conducted iaw PANS OPS and the procedure notified in the UKAIP which, where appropriate, is used as the source data for coding the approaches in navigation databases and brings the required degree of data integrity.
	REXC 4 The integrity and accuracy of the navigation aids used for the instrument approach meet the required standards.
	REXC 5 The crew members of participating aircraft are suitably qualified and proficient to safely execute an IAP with sufficient accuracy to allow a safe landing to be made on the runway or a missed approach to be executed safely.

Safety Baseline	**Candidate Alternative Safety Arguments**
Goal 1.2 The Risk of a Runway Excursion accident is acceptably low (REXC)	
REXC 1 CAP 168 Instrument Runway Standards are met.	
REXC 1.1 CAP 168 compliant Runway Dimensions, Markings, and lighting assist pilots in reducing the risk of runway excursion by enhancing visual determination of runway boundaries and touchdown area, thereby aiding early visual detection and stable approach to safe touchdown in the correct position.	REXC 1.1.1 Use Of 'IAP with Higher Minima. Arguments could be made for provision of a reduced form of AD lighting and/or runway marking on the basis that an 'IAP with Higher Minima' procedure as described at Appendix 1 was used which would terminate at an altitude and distance from the AD using suitably conservative aerodrome operating minima which would allow more time for visual acquisition of the local runway environment. Arguments which included the deployment of visual approach aids and an associated survey/checking regime would carry additional weight. However, much higher minima would be required and the utility of the IAP in poor visibility and/or low cloud conditions would be more limited operationally than for other types of IAP. continued overleaf

Safety Baseline	**Candidate Alternative Safety Arguments**
REXC 1.2 CAP 168 compliant instrument runway strip and Runway End Safety Area (RESA) assist in mitigating the effects should a runway excursion occur.	REXC 1.2.1 RESA Requirement - Use of IAP with Higher Minima. Although a RESA provides extremely useful mitigation should a runway excursion occur, it is not normally required for a runway which meets Code 1 or 2 and does not have an IAP. Arguments against the need for a RESA where an IAP with Higher Minima approach is to be used with suitably conservative aerodrome operating minima (which give crews longer to stabilise the approach) (see Appendix 1 for more details) are therefore more likely to be successful. REXC 1.2.2 RESA Requirement - Limitation of IAP to certain Aircraft Categories. Because use of the IAP with Higher Minima iaw Appendix 1 is additionally limited to aircraft of lower speed categories (typically Cat A,B and H) this would effectively remove aircraft of larger mass from the equation giving more credence to an argument that absence of a RESA would have less safety significance.
REXC 2 ANO 172 Requirement for Approach Control is met.	
REXC 2.1 Approach control provides crew with information on runway condition and surface wind info which will assist in reducing the risk of a runway excursion accident.	REXC 2.1.1 Runway Condition and Surface Wind Reporting – Aerodrome ATS or AFIS. Where an aerodrome ATS or AFIS is provided, in the absence of approach control, an argument could be made that the runway condition/surface wind information could still be provided by the controller or AFISO. The basis of such an argument could be that this provides an equivalent level of risk (in this case of passing incorrect weather information) to that provided at aerodromes where the duties of approach and aerodrome controller are periodically discharged by a single individual. REXC 2.1.2 Runway Condition and Surface Wind Reporting – Aerodrome with AGCS. Where only AGCS is provided, and in the absence of an approach control service, an argument could be made that 'unofficial runway condition/surface wind reports' could be provided to the aircraft commander by the AGCS operator. Such arguments could be strengthened by the use of ICAO compliant meteorological equipment, however, the more limited qualification and privileges of the AGCS operator would mean that additional mitigation is likely to be needed in the form of the use of higher minima for an IAP which would give the commander more time to establish a stable, visual, final approach. Where an IAP with Higher Minima type of approach, as described at Appendix 1, is to be used, an argument could be made that the use of an unofficial weather observation provided by an AGCS operator could be acceptable on the basis that with this type of approach used with appropriately conservative aerodrome operating minima would leave an adequate safety margin. REXC 2.1.3 Runway Condition Reporting – Aerodrome with neither ATS nor AGCS. Where no aerodrome ATS or AGCS is provided (for example at a private landing strip, or an 'unmanned' aerodrome where SafetyCom is used by joining and departing aircraft) the risk of runway excursion by an aircraft arriving from an IAP are more difficult to mitigate. An argument at some locations could be based upon the use of a IAP with Higher Minima as outlined at Appendix 1 with suitably conservative aerodrome operating minima which would give the commander more time to establish a stable, visual, final approach. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
	REXC 2.1.4 Surface Wind Reporting - Aerodrome with neither ATS nor AGCS. Where no aerodrome ATS or AGCS is provided (for example at a private landing strip, or an 'unmanned' aerodrome where SafetyCom is used by joining and departing aircraft), arguments could be made about the use of surface wind information obtained by the aircraft commander from a nearby aerodrome which is able to generate meteorological reports based upon ICAO compliant equipment. An argument at some locations could also be based upon the use of Volmet or neighbouring ATIS broadcasts. Such arguments would, again carry more weight if used in the context of an IAP with Higher Minima approach as outlined at Appendix 1 used with suitably conservative aerodrome operating minima. The distance between the adjacent aerodrome and the IAP location would be of relevance as in certain meteorological conditions there can be significant variations in local conditions between neighbouring observation points. Local topography would also need to be addressed in any such safety argument.
REXC 3 The IAP design has been conducted iaw PANS OPS and the procedure notified in the UKAIP which, where appropriate, is used as the source data for coding the approaches in navigation databases and brings the required degree of data integrity	
REXC 3.1 Use of PANS-OPS IAP Design criteria reduces the risk of runway excursion by permitting the aircraft to fly to an altitude and position from which the pilot can decide whether it is either safe to land or may execute a missed approach.	REXC 3.1.1 Use of Simplified IAP Design Methodology – Aircraft Category Limitation. An argument for the use of a simplified IAP design approach as explained in more detail at Appendix 2 could be enhanced by limiting use of the procedure to aircraft within the lower speed categories A,B or H, under additional limiting conditions such as those outlined at Appendix 1.
REXC 4 The integrity and accuracy of the navigation aids used for the instrument approach meet the required standards	
REXC 4.1 The integrity and accuracy of the navigation aids used for instrument approaches are such that they will provide the crew of participating aircraft with sufficiently reliable and accurate guidance to enable them to follow the published IAP within the tolerable limits required to allow a safe landing to be made on the runway or a safe missed approach to be executed.	REXC 4.1.1 Integrity of Ground Based Navigation Aids. The integrity of navigation aids is a measure of the reliance that can be put on the aid in radiating a correct signal. The integrity depends on the ability of the aid to radiate an in tolerance signal and also of the inbuilt monitoring systems to recognise when the signal is out of tolerance and shutdown the faulty system. The integrity of ground based navigation aids is assessed when the aid is first approved for use, with manufacturers evidence of reliability of all parts of the system being taken into account. The ongoing reliability of those parts of the system will give confidence that the integrity requirements continue to be met. continued overleaf

<table>
<tr><th>Safety Baseline</th><th>Candidate Alternative Safety Arguments</th></tr>
<tr><td></td><td>REXC 4.1.2 Cross checking of Other Sources of Information by Aircraft Commander. As a mitigation for rare integrity failures, when systems radiate incorrect information, Pilots will cross check other systems to give confidence that all is as it should be or to alert them that there is a problem with the guidance being used. For example a pilot making an ILS approach will check the height of the aircraft at a certain DME range to be sure the glide path information is correct.

REXC 4.1.3 GPS has no internal monitoring system to give timely warning of incorrect guidance being transmitted, instead Integrity monitoring relies on augmentations such as the use of receivers equipped with RAIM (Receiver Autonomous Integrity Monitoring). In lieu of manufacturers evidence to support the approval of an approach using GPS guidance, CAA makes available historical monitoring data to allow the assessment of the integrity in conjunction with the certified reliability of the RAIM algorithm. Note that Pilot cross checks as above are still required to mitigate against integrity failures in the system.</td></tr>
<tr><td colspan="2">REXC 5 The crew members of participating aircraft are suitably qualified and proficient to safely execute an IAP with sufficient accuracy to allow a safe landing to be made on the runway or to execute a safe missed-approach.</td></tr>
<tr><td>REXC 5.1 The flight crew training and qualification standards which must be met are sufficient to provide for IAPs to be flown safely and accurately, to a position in space from which a safe landing can be made on the runway or a missed approach can be executed safely.</td><td>No alternative safety argument is considered appropriate for this baseline safety solution.</td></tr>
</table>

Goal 1.3 The Risk of a Runway Collision accident is acceptably low. (RCOLL	
	RCOLL 1 ANO Art 172 requirement for Approach Control is met.
	RCOLL 2 CAP168 Instrument Runway standards are met.
	RCOLL 3 Aerodrome ATS is provided.
	RCOLL 4 The crew members of aircraft participating in the IAP and others using the aerodrome are suitably qualified and proficient to operate safely in the visinity of the runway.

Safety Baseline	Candidate Alternative Safety Arguments
Goal 1.3 The Risk of a Runway Collision accident is acceptably low (RCOLL)	
RCOLL 1 ANO 172 Requirement for Approach Control is met	
RCOLL 1.1 Approach control provides sequencing of Instrument Approach traffic to reduce the risk of runway collision between participating instrument traffic	RCOLL 1.1.1 Management of IAP Use. In the absence of approach control, arguments would need to be made concerning the management of use of the IAP using some form of PPR and slot times with suitable arrangements for dealing with slippages/delays etc.
RCOLL 2 CAP 168 Instrument Runway Standards are met.	
RCOLL 2.1 CAP 168 compliant signage, runway markings and lighting assist pilots, aerodrome vehicle drivers and pedestrians in reducing the risk of runway collision by enhancing visual determination of holding points and runway boundaries.	RCOLL 2.1.1 Management of IAP. Arguments with regard to mitigation of this risk at minor aerodromes, particularly unlicensed aerodromes and those with a public right of way may need to include the use of enhanced markings and signage particularly as the lower Category aerodromes normally have a lower scale of signage and markings. Arguments could, for example, take into account the benefits of aerodrome ground lighting (AGL) in reducing the risk of such incursions.
RCOLL 3 Aerodrome ATS is provided	
RCOLL 3.1 Provision of an aerodrome ATS reduces risk of runway collision between instrument and visual traffic.	RCOLL 3.1.1 Aerodrome ATS. Where an aerodrome ATS is provided, this baseline mitigation would continue to apply. Similarly, where information is provided by an AFISO an argument could be made that traffic information regarding runway occupancy provided by the AFISO provides mitigation of this risk. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
	RCOLL 3.1.2 Without Aerodrome ATS. Where AGCS is provided, or SafetyCom is used, mitigation of this risk is limited to the ability of the aircraft commanders to detect conflicting runway traffic visually and would be less effective. Additional mitigation arguments could centre upon the use of a IAP with Higher Minima approach which requires the aircraft using the IAP to approach the aerodrome visually or the use of higher minimums for other types of IAP. A managed system of IAP slot times (PPR) under such circumstances would provide further strength to such arguments. RCOLL 3.1.3 Use of Higher Minima. An argument could be made that the use of higher minima for the IAP, particularly if used in the context of an 'IAP with Higher Minima' approach, would allow participating crews completing such an approach more time in the VMC environment in which to detect visually and to avoid other traffic.
RCOLL 3.2 Provision of an aerodrome ATS reduces risk of runway collision between instrument traffic and vehicles/towed aircraft etc.	RCOLL 3.2.1 Aerodrome ATS. Where an aerodrome ATS is provided, this baseline mitigation would continue to apply. Similarly, where information is provided by an AFISO an argument could be made that traffic information regarding runway occupancy provided by the AFISO provides mitigation of this risk. RCOLL 3.2.2 Without Aerodrome ATS. Where AGCS is provided, or SafetyCom is used, mitigation of this risk is limited to the ability of the aircraft commander to detect conflicting runway vehicular traffic. etc visually and would be less effective. Additional mitigation arguments could centre upon the use of an IAP with Higher Minima approach which requires the aircraft using the IAP to approach the aerodrome visually or the use of higher minimums for other types of IAP.
RCOLL 3.3 Provision of an aerodrome ATS and associated runway inspection regime reduces the risk of runway collision between aircraft and foreign objects including wildlife	RCOLL 3.3.1 Runway Inspections by AGCS Operator. In the absence of ATS, safety arguments could be developed around the introduction of runway inspections by other staff such as AGCS operators prior to arrivals by aircraft using the IAP. RCOLL 3.3.2 Aerodrome Security, Types of Operations and Risk Exposure. Effective arguments against this risk at minor aerodromes would be more difficult to develop and would need to centre upon aerodrome security arrangements, access gates, fencing etc and the vulnerability of the type of aircraft operations envisaged to the consequences of such collisions. Such arguments would be harder to justify in the case of night operations although this may be possible in the case of non-public transport operations using low inertia light aircraft where the effectiveness of landing lights may be argued. In this context risk exposure arguments could be developed relating the exposure of certain types of aircraft operators using the aerodrome in comparison with similar risks (collision with foreign objects, wildlife etc) as, for example, a road user.
	RCOLL 3.3.3 Use of IAP with Higher Minima approach. An argument could be made that use of an IAP with Higher Minima (as described at Appendix 1) would result in the aircraft transitioning to visual flight rules before joining the aerodrome environment would allow more time for obstacles to be detected, thereby providing further mitigation against this risk.
	RCOLL 3.3.4 Helicopter Operations. An argument could be made about the lower risk posed to helicopter operations, particularly when a PINS approach is to be used. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
RCOLL 4 The crew members of aircraft participating in the IAP and others using the aerodrome are suitably qualified and proficient to operate safely in the vicinity of the runway.	
RCOLL 4.1 The flight crew training and qualification standards which must be met are sufficient to provide for aircraft operations in the vicinity of the runway, including the IAPs, to be conducted safely and minimise the risk of collisions with other aircraft, vehicles, personnel, wildlife or other foreign objects.	No alternative safety argument is considered appropriate for this baseline safety solution.

Goal 1.4 The Risk of a Mid Air Collision accident is acceptably low. (MAC)	
	MAC 1 ANO Art 172 requirement for Approach Control is met.
	MAC 2 An Aerodrome ATS is provided.
	MAC 3 Airspace design measures are in place in the vicinity of the aerodrome.
	MAC 4 The aerodrome location and presence of an IAP are depicted in the UK AIP and, where appropriate, on aeronautical charts.
	MAC 5 Visual lookout by aircraft crews and the 'see and avoid' principle provides some protection against mid-air collision during relevant portions of flying an IAP.

Safety Baseline	**Candidate Alternative Safety Arguments**
Goal 1.4 The Risk of a Mid-Air Collision Accident is acceptably low (MAC)	
MAC 1 ANO 172 Requirement for Approach Control is met	
MAC 1.1 Approach control reduces the risk of mid-air collision between participating instrument traffic by providing separation[1]. 1 This statement describes the mitigation provided by an Approach Control service as currently mandated by ANO Art 172 and which is provided without the use of data from surveillance sensors – it is known as 'Approach Control Procedural'.	MAC 1.1.1 Separation of Participants – ATSU. In the absence of approach control an argument could be centred around a local agreement whereby aircraft intending to use the IAP make initial contact and receive a suitable form of ATS from an adjacent ATSU which would ensure initial separation between users. Such arrangements would need to be reflected in MATS Pt 2 and supported, where appropriate, with modifications to controller qualifications, local training arrangements, local competency schemes, SMS and LoAs. Local procedures (associated with LoAs etc) would need to involve direct communication between the ATSU and the aerodrome, and would need to make adequate arrangements for dealing with potential conflicts between aircraft holding, making an approach and following the missed approach procedure. MAC 1.1.2 Separation of Participants under Aerodrome ATC – Management of IAP use by Participating Aircraft Commanders. Where aerodrome ATC is provided, in the absence of an agreement with a local ATSU, an argument could be made that the operation of the IAP could be managed by aircraft commanders using some form of PPR and slot times with suitable arrangements for dealing with slippages/delays etc such that users of the IAP are separated in time. Such arguments would be strengthened by the provision of traffic information on IAP users by aerodrome ATC which would allow other participants to delay commencement of the IAP in the event of slippages, delays and missed approaches etc. Such arrangements would need to be promulgated on the approach plates as a restriction in use. It could be argued that this would provide an equivalent level of risk to that provided at aerodromes where the duties of approach and aerodrome controller are periodically discharged by a single individual. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
	MAC 1.1.3 Separation of Participants under AFIS – Management of IAP use by Participating Aircraft Commanders. Where aerodrome FIS is provided, in the absence of an agreement with a local ATSU, an argument could be made that the operation of the IAP could be managed using some form of PPR and slot times with suitable arrangements for dealing with slippages/delays etc such that only one user of the IAP is permitted at any given time. Such arguments would be strengthened by the provision of traffic information on IAP users by the AFISO which would allow other participants to delay commencement of the IAP in the event of slippages, delays and missed approaches etc. Such restrictions in use would need to be promulgated on the approach plates and the associated UKAIP entry. MAC 1.1.4 Separation of Participants without ATS – Management of IAP use by Participating Aircraft Commanders. Where it is proposed to introduce an IAP at an aerodrome where no ATS is provided (and this would be limited to non public-transport operations) an argument could be made for self-separation of participating aircraft. Such arguments would need to draw heavily upon restrictions placed on the approach plate (and associated UK AIP entry) which would require that aircraft commanders did not pass a certain point early in the published procedure until it had been positively established on an appropriately published frequency that no other aircraft had commenced the procedure. Such arguments would be stronger where use of the IAP was restricted to specific operators as it would depend upon all participants using G/A radio and would need to provide safeguards against the associated risk of mis-setting frequencies. Similarly, such arguments would carry more weight if associated with the promulgation of suitably robust 'lost-communications' procedures in the aerodrome UKAIP entry. MAC 1.1.5 Separation of Participants – IAP Restricted to Slower Aircraft Categories. Arguments for the separation of participating aircraft using some form of PPR/slot-time system, as outlined above, would be strengthened by restricting the use of the IAP to certain speed categories of aircraft (A, B and H for example) which would assist by limiting the scale of speed differential between participating aircraft. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
MAC 1.2 Where the nature and level of traffic requires it, provision of surveillance data allows approach controllers to further reduce the risk of mid-air collision, both between participating traffic and against non-participating traffic.	MAC 1.2.1 Non-Participating Aircraft Conflict Risk – ATSU. In the absence of an approach control service using surveillance, an argument could be centred around a local agreement whereby aircraft intending to use the IAP make initial contact and receive a suitable form of ATS (such as an ATSOCAS deconfliction service) from an adjacent ATSU. However, unless this extended to a formal agreement for the adjacent unit to provide an Approach Control service with all the associated requirements for unit procedures, training, and regulation pertinent to such a service, such an arrangement would not include the sequencing and integration of multiple aircraft using the instrument approach. However, traffic information and/or deconfliction advice appropriate to the level of ATSOCAS could be provided on conflicting aircraft. This would therefore extend the argument beyond initial integration of users and provide increased mitigation against conflict with detected non-participating traffic. Local procedures may need to involve direct communication between the ATSU and the aerodrome as identified through the SMS process of the adjacent ATSU. The relative merits of such arguments would be dependent upon the extent of surveillance coverage provided in the vicinity of the aerodrome at the altitudes in question.
	MAC 1.2.1 Non-Participating Aircraft Conflict Risk – ATSU. In the absence of an approach control service using surveillance, an argument could be centred around a local agreement whereby aircraft intending to use the IAP make initial contact and receive a suitable form of ATS from an adjacent ATSU which would provide a suitable form of ATSOCAS (such as a deconfliction service). However, such service would not include the sequencing and integration of multiple aircraft using the instrument approach as this would become the provision of approach control and would require the unit procedures, training, and regulation pertinent to such a service. However, traffic information and/or deconfliction advice appropriate to the level of ATSOCAS provided could be provided on conflicting aircraft. This would therefore extend the argument beyond initial integration between users and provide increased mitigation against conflict with detected non-participating traffic. Local procedures would may need to involve direct communication between the ATSU and the aerodrome as identified as necessary through the SMS process of the adjacent ATSU. The relative merits of such arguments would be dependent upon the extent of surveillance coverage provided in the vicinity of the aerodrome at the altitudes in question.

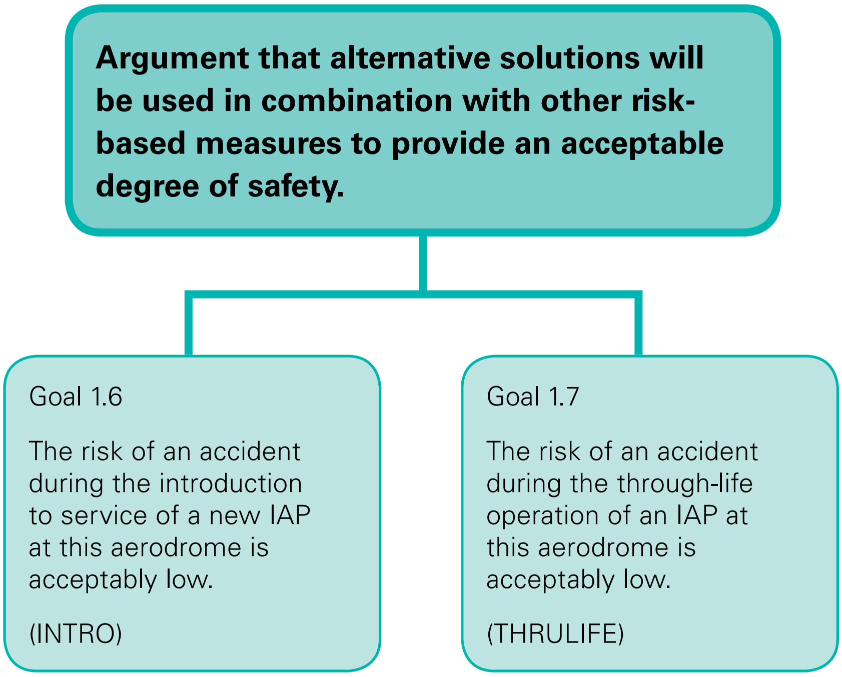
Safety Baseline	**Candidate Alternative Safety Arguments**
MAC 2 An aerodrome ATS is provided	
MAC 2.1 Aerodrome ATC (ADI) reduces the risk of collision between Instrument Traffic and other known traffic in the aerodrome environment - i.e. by sequencing visual circuit traffic, and providing traffic information on both transiting traffic and infringing traffic which is detected visually.	MAC 2.1.1 Managed Use of IAP and Benign Traffic Environment. Where traffic levels are relatively low and the IAP is to be used infrequently, it may be possible to make an argument that an aerodrome ATCO (who would need to hold an ADI rating in order to comply with the requirements of Regulation (EC) 805/2011 on ATCO Licensing) could be used to issue deconfliction instructions to visual traffic as required in order to take spacing for traffic using the IAP. Arguments for this key risk to be managed in an alternative way would be difficult to justify at a large number of aerodrome locations. Where ATS is provided by an AFISO, or at locations where an AGCS is provided, it is not possible for mandatory instructions to be issued from the ground which would provide spacing between visual and instrument traffic. A combined argument would therefore need to be made around managed use of an IAP with Higher Minima (as described at Appendix 1) by aircraft commanders using some form of PPR/slot times as a promulgated condition of use and a benign airspace environment in which no visual circuit traffic is simultaneously present. Arguments based upon an assertion that the risk of conflict with non-participating traffic is very low are only likely to be credible at aerodromes in relatively remote areas of UK airspace or at some minor airstrips and helicopter landing sites. At other locations it would be necessary to demonstrate that the aerodrome operator has procedures in place which would provide an effective means of separating completely operations at the aerodrome between aircraft using the visual pattern under VFR and those operating under IFR using the IAP, including the associated missed approach procedure. This would require the aerodrome operator to have an effective process in place to close the aerodrome visual pattern by instructing the AFISO/AGCS Operator to include within the aerodrome information which is broadcast to aircraft, information that the visual circuit was closed whenever the IAP was in use and vice versa. Such arguments would be strengthened by the associated use of other airspace design measures such as the use of CAS, ATZ and RMZ/TMZ (as indicated below). It is, however, considered very unlikely that a cogent safety argument could be made for an IAP to be established which would introduce instrument traffic frequently at a busy aerodrome with an active visual traffic pattern without provision of Approach Control.
MAC 3 Airspace design measures are in place in the vicinity of the aerodrome.	
MAC 3.1 An ATZ provides a 'known' traffic environment close to the aerodrome itself which reduces the risk of collision between instrument traffic and non-participating visual traffic .	MAC 3.1.1 Aerodrome Traffic Zone. An argument could be made for consideration to be given to the creation of an ATZ in support of such an IAP where one did not currently exist. Whilst an ATZ would not be established solely to support an IAP, the presence of such a procedure might support a case for an ATZ where one did not currently exist dependent upon the licensed status of the aerodrome in question and the level of service provision (ATC/AFIS/AGCS). Justification would need to be made using the established process under the Airspace Charter through CAA which would include the potential impact upon other airspace users in the context of the safety benefit likely to be derived, although, as for all proposed airspace changes, there could be no guarantee that such an application would be successful. continued overleaf

Safety Baseline	Candidate Alternative Safety Arguments
MAC 3.2 Where the nature and level of traffic requires it, CAS further reduces the risk of collision between instrument traffic and non-participating visual traffic by providing a known and controlled local air traffic environment which extends further beyond the boundaries of the ATZ.	MAC 3.2.1 Presence of existing Controlled Airspace (CAS) and suitable ATS. An argument could be made in support of the introduction of such an IAP where the aerodrome location lies beneath or immediately adjacent to existing CAS and an effective working arrangement can be established with the controlling unit for the provision of a suitable form of ATS which whilst not constituting a dedicated 'Approach Control Service' would nonetheless, when properly established through a suitable vehicle such as an MoU, serve to reduce the risk of collision. MAC 3.2.2 New Controlled Airspace (CAS). An argument could be made for the creation of CAS in support of such an IAP. Justification would need to be made using the established process under the Airspace Charter through CAA which would include the potential impact upon other airspace users in the context of the safety benefit likely to be derived. MAC 3.2.3 Use of Transponder Mandatory Zones/Radio Mandatory Zones (TMZ/RMZ). An argument could be made for the creation of TMZ and/or RMZ in support of such an IAP and which could be used to provide a known traffic environment. Justification would need to be made using the established process under the Airspace Charter through CAA and would include the potential impact upon other airspace users in the context of the safety benefit likely to be derived. As for all proposed airspace changes, there could be no guarantee that such an application would be successful.
MAC 4 The aerodrome location and presence of an IAP are depicted in the UKAIP and, where appropriate, on aeronautical charts.	
MAC 4.1 Marking the Aerodrome and instrument approach paths (feathered arrows) on aviation charts assists pilots of non-participating aircraft in avoiding these areas, thereby reducing the risk of mid-air collisions with non-participating traffic.	MAC 4.1.1 Marking of IAP Locations on Aeronautical Charts. In the same way as some safety mitigation is provided for existing IAPs through making other airspace users aware of the presence of instrument approach paths so they can be avoided, such action could also be used to strengthen arguments for the introduction of a new IAP under the policy outlined in this CAP. The safety benefit of this measure would need to be argued in the context of the parallel need to reduce the associated risk of map clutter. A threshold value would probably need to be established, centred around anticipated numbers of movements, which would trigger the creation of appropriate symbology. (For unlicensed aerodromes, such mitigations may also be applicable at a later stage of policy development. Text in this area will be updated when this work is complete. For example, it is possible that a separate UKAIP section could be developed for the IAPs to unlicensed Aerodromes where each entry could be accompanied with a data section showing the aerodrome layout and essential information. It is likely that this process will lead to the creation of new ICAO designators in each case (and possibly associated aerodrome re-naming) for the purpose of coding IAPs in avionics databases and for the publication of NOTAMs in certain circumstances (i.e. unserviceable conventional approach aids).

Safety Baseline	Candidate Alternative Safety Arguments
MAC 5 Visual lookout by aircraft crews and the 'see and avoid principle' provides some protection against mid-air collision during relevant portions of flying an IAP.	
MAC 5.1 During any portion of the procedure where an aircraft flying the IAP is in VMC the 'see and avoid' principle provides a degree of mitigation against the likelihood of collision with other aircraft.	MAC 5.1.1 An argument could be made that whilst flying an IAP with Higher Minima approach as described at Appendix 1, the more conservative aerodrome operating minima provide more opportunity where visual conditions exist, for 'see and avoid,' to mitigate this risk.

Goal 1.5 The Risk of a Loss of Control accident is acceptably low. (LOC)	
	LOC 1 ANO Art 172 requirement for Approach Control is met.
	LOC 2 An Aerodrome ATS is provided.
	LOC 3 Flight crews training and examination covers the effects of Wake Turbulence and the associated operational countermeasures which they should apply in order to avoid Wake Turbulence encounters which could lead to a loss of control

Safety Baseline	**Candidate Alternative Safety Arguments**
LOC 1 ANO 172 Requirement for Approach Control is met	
LOC 1.1 Approach control reduces the risk of a loss of control accident arising from Wake Turbulence by sequencing participating instrument approach traffic	LOC 1.1.1. – Managed use of IAP. An argument could be made here on the basis of the use of a form of PPR/slot-time system to mitigate this risk in the absence of an Approach Control Service. Such arguments would be strengthened where use of the approach is limited to certain categories of aircraft (typically, A, B and H) which would also reduce the risk from wake turbulence encounters. This mitigation combined with a PPR/slot time system would also provide mitigation against this risk where no ATS is provided.
LOC 2 An aerodrome ATS is provided	
LOC 2.1 Aerodrome ATC reduces the risk of a loss of control accident arising from Wake Turbulence by sequencing visual landing traffic and participating instrument approach traffic.	LOC 2.1.1. – Managed use of IAP and ATC Instructions. At aerodromes where ATC is provided, arguments based on the use of a form of PPR/slot-time system to mitigate the wake vortex risk would be strengthened both by limiting use to certain categories of aircraft (typically, A, B and H) and the ability of the controller to issue instructions which would build in wake separation distances if required.
LOC 3 The crew members of aircraft participating in the IAP are suitably qualified and proficient to fly the IAP safely and under control.	
LOC 3.1 The flight crew training and qualification standards which must be met are sufficient to provide for IAPs to be flown safely and accurately, with appropriate training/ awareness of wake turbulence considerations.	No alternative safety argument is considered appropriate for this baseline safety solution.
Goal 1.5 The Risk of a Loss of Control Accident is acceptably low (LOC)	



Goal 1.6 The Risk of an accident during the introduction into service of a new IAP at this aerodrome is acceptably low. (INTRO)
INTRO 1 An argument that the introduction to service of the IAP together with all the required safety mitigations and notifications to airspace users and other stakeholders will be conducted in a structured and carefully managed way which may, where deemed appropriate, include a period of trial operation with additional safety mitigations in place to provide further risk reduction and provide safety evidence in support of key safety arguments presented. Such arguments should be suitably comprehensive, and include as a minimum, arrangements for the safe introduction of the IAP in the context of training, testing and validation of:
The people who will be involved or affected by the introduction of the IAP, their training and any associated communication activities for awareness purposes.
The procedures which are to be followed by aerodrome personnel or participating flight crews and any associated organisational arrangements which need to be put in place before the IAP can be put into use.
Equipment which will be associated with the operation of the IAP, its suitability, fitness for purpose and availability
Goal 1.7 The Risk of an accident during the through-life operation of an IAP at this aerodrome is acceptably low. (THRULIFE)
THRULIFE 1 An argument that a safety monitoring and feedback process will be put in place by the aerodrome operator which will provide feedback on safety information regarding the operation of the IAP which will be used to monitor the continued validity of the alternative safety arguments used and provide a trigger for additional safety management activity if new hazards are discovered or the level of risk is deemed to have changed.

APPENDIX 1

IAP with higher minima

General

This appendix outlines a methodology which applicants may wish to employ together with associated safety mitigations in order to provide an IAP with restrictions where it is operationally acceptable at aerodromes which do not fully meet instrument runway criteria and/or do not provide an approach control service.

The 'IAP with higher minima' outlined in this section would be suitable for operational use subject to acceptance of the results of safety assessment, firstly by the aerodrome operator (the 'risk owner') and secondly by the Authority as part of the IAP approval process. This would also have the effect of adding to the existing network of available IAPs in the UK which can be used to support intentional IFR operations. It is not the CAA's intention that these, more restrictive, IAPs should be deployed at aerodromes which already meet the runway and ATS standards required for provision of an IAP as this would have the contrary effect of reducing the availability of UK aerodromes which can provide an Obstacle Clearance Height (OCH) at or above system minima.

The underpinning principles associated with the type of IAP outlined in this appendix are:

1. IAP designs will be compliant with PANS-Ops and will therefore not be unfamiliar to pilots.
2. The system minima OCH will be more restrictive than those which apply at aerodromes which meet the extant aerodrome and ATS standards. This will reflect:
    a) Safety mitigation for the reduced standards of aerodrome infrastructure and/or ATS provision provided at the aerodrome.
    b) The more limited operational utility of an IAP where the full aerodrome infrastructure and/or ATS standards have not all been met.
3. The IAP will normally be available for use by aircraft with approach speed Category A,B or H and may be further restricted by aerodrome operators to specific operating companies and/or individuals as part of the associated safety mitigations.

4. The IAP will be used only by IR or IMCR qualified pilots using aircraft navigation equipment which is approved as suitable for use as an approach aid.
5. The IAP will be published in the UK AIP and, where appropriate, will be marked on air navigation charts.

The resultant IAP will be based on the following:

OCH – system minima	Not less than 500 ft (subject to there being no more limiting obstacles)
RVR/Visibility	Not less than 1800 m
Runway/Survey Requirement	CAP 232 Aerodrome survey NPA - Classification 1 Approach with vertical guidance - Classification 2
Airspace/ATS Environment	Approach Control and/or ATC (at least ADI) provided or means established to ensure no concurrent use of IAP and visual circuit traffic

Absence of an Approach Control Service

Where an applicant presents an argument that it would not be reasonably practicable to provide an approach control service, safety arrangements shall be developed to make robust provision for no more than one aircraft at a time to use the IAP and any associated holding pattern. Such procedures will need to be properly documented, restrictions made known to users, for example by marking them appropriately on the relevant approach plates, and must be reviewed regularly for their effectiveness as part of an agreed process. Associated safety arguments would need to be centred on a 'Prior Permission Required' (PPR) basis at specified times. Examples of such arrangements which could form the basis of safety arguments could include:

1. The procedure is only to be used by a single operator and the arrival times are deconflicted and managed to ensure safe spacing between arrivals;
2. A robust PPR requirement is in place for booking use of the instrument approach procedure with clear 'slot' times and sterile buffer times in between;

3. The aerodrome is in an isolated area and has low levels of traffic both at the airfield and in the environs. (An application using this argument is more likely to be successful from a small aerodrome where the aircraft on the approach may be the only, or one of only a small number that operates to/from that aerodrome.)

Runway environment

Arguments for the establishment of this type of IAP may be appropriate in circumstances where an aerodrome runway does not meet all the CAP 168 'instrument runway' standards and where it would not be reasonably practicable to make the changes required to the runway environment at this location in order to meet the full 'instrument runway' standard. This type of IAP would provide operational benefit to aerodrome users in circumstances where lower cloud bases and, to a lesser extent, poorer visibility would limit VFR operations. The higher OCH would provide a greater visual segment which would provide greater opportunity for the runway visual environment (or other visual references accepted by the Authority[14]) to be detected or, if not, for a safe missed approach to be flown.

Survey requirements

The minimum obstacle data required for this type of IAP (conventional and RNAV NPA) is listed in Appendix 2, Para 4. Where it is apparent that there are trees in the vicinity of the manually inserted obstacle then an additional allowance of 30m shall be applied. This 30m allowance shall be applied in all designs where only the CAP 232 Aerodrome Survey Classification 1 is available.

Due to the limited data available in an Aerodrome Survey Classification 1, designers are required to utilise all available sources of data to fully assess the applicable procedure segments. The use of 50k and 250k OS mapping are essential whilst the use of Digital Terrain Modelling (DTMs), Google Earth and even Google Street View are all valuable tools in assessing obstacles and the need for additional vertical allowances. Where an LPV approach is to be designed, in addition to the above, a CAP 232 Aerodrome Survey Classification 2 shall be provided (See Appendix 2, para 4.2). An on-site visit shall be part of the IAP design process

14 In addition to the normal visual reference requirements there is provision for the use of "other visual references accepted by the Authority" and in certain circumstances the CAA may accept proposals that other visual references such as 'lead-in' visual markers, strobe lights or where, for example, the runway is a natural surface (grass etc) the aerodrome itself could be nominated in specific cases.

Airspace/ATS environment

This type of IAP may be introduced with the appropriate mitigations where an approach control and/or ATC service is provided which would facilitate the integration of IFR and VFR traffic. This type of IAP could only be introduced safely at aerodromes which have either AFIS or no ATS if robust arguments could be made to show that there could be no concurrent IFR and VFR activity in the vicinity of the aerodrome. In remote locations such arguments could, exceptionally, be made on the basis of very low air traffic density. At other locations it would be necessary to demonstrate that the aerodrome operator has procedures in place which would provide an effective means of separating operations between aircraft using the aerodrome visual pattern under VFR and those operating using the IAP including the associated missed approach procedure. This would mean having a process to effectively close the aerodrome visual pattern whenever the IAP was in use and vice versa.

Generic IAP design criteria

A fundamental principle is that IAP designs should be kept as simple and standard as possible (e.g. whenever possible, no offsets, RNAV MAPt at the runway threshold, no Step Down Fixes (SDFs) and missed approaches straight ahead initially before any turns etc.) Wherever possible for RNAV procedures, the RNAV MAPt should be located at the approach runway threshold as this provides better situational awareness for the pilot. However, there may be occasions where it may be necessary to consider establishing the MAPt elsewhere. The use of a SDF in the final segment will not be allowed as the likelihood is that any gain from using a SDF would be negated by use of the raised OCH. Similarly, the use of waypoints between the FAF and the MAPt in an RNAV IAP will not be allowed. In the UK this has been highlighted as a safety issue and the coding houses have been instructed by the CAA not to code any waypoints/fixes between the FAF and the MAPt. This is so that the distance displayed to the pilot after passing the FAF is the distance to the runway threshold (which is also the IAP MAPt in most cases). This improves the situational awareness of the pilot in the final approach segment of an IAP.

Flight validation may be required for a new procedure, particularly in the case of reduced aerodrome infrastructure; reduced survey requirements; the distance from the aerodrome that the aircraft will reach the MDA/DA; and an assessment of the view ahead to acquire the visual references, including, where applicable, 'other visual references' accepted by the Authority. (See Policy Statement - Validation of Instrument Flight Procedures.

APPENDIX 2

Instrument approach procedure

Design criteria and methodology for the calculation of OCA(H) for category A and B aircraft to non instrument runways in the UK

General concepts

This appendix provides CAA approved procedure designers (APD) with the design criteria to enable the design of IAPs to non instrument runways in the UK. The general ICAO Pans Ops Doc 8168 Vol II design criteria and AIP notified UK differences to Doc 8168 as amplified or modified by criteria in this appendix shall apply throughout the design.

Design assumptions

The runway status (Non Instrument Runway) as designated by the CAA shall not be changed by the provision of an IAP to a runway.

Currently IAPs will only be designed and approved for licensed aerodromes in accordance with CAP 785.

IAPs shall be promulgated in the UK AIP.

Digital Vertical Obstruction File (DVOF) obstacle data shall be available to all CAA Approved Procedure Designers (APDs).

Only Non Precision IAPs shall be designed to Non Instrument Runways where only a CAP 232 Aerodrome Survey Classification 1 is available. (See CAP 232 Chapter 1 Paragraph 6 Survey Areas – Table 1).

IAPs with vertical guidance (ILS or SBAS for example) to Non Instrument Runways may be considered by the CAA on a case by case basis where a CAP 232 Aerodrome Survey Classification 2 is available. (See CAP 232 Chapter 1 Paragraph 6 Survey Areas - Table 1).

The minimum OCH that can be achieved under this policy is 500 ft regardless of whether the procedure is promulgated for CAT A or for CAT A & B.

Design criteria

Mitigation for the lack of survey data and/or aerodrome infrastructure will be in the extra allowances/minimum OCH applied as described in paragraph 4 below.

Wherever possible the RNAV MAPt should be located at the approach runway threshold. But where necessary for obstacle reasons it may be moved away from the threshold towards the final approach fix (FAF) in accordance with Pans Ops Doc 8168.

The use of a SDF in the final segment is not allowed (the likelihood is that any gain from using a SDF will be negated by using the minimum OCH of 500ft).

The use of waypoints between the FAF and the MAPt in an RNAV IAP is not allowed. In the UK this has been highlighted as a safety issue and the coding houses have been instructed by the CAA not to code any waypoints/fixes between the FAF and the MAPt. This ensures that the distance displayed to the pilot after passing the FAF is the distance to MAPt, which in most cases is the runway threshold and this is likely to increase the situational awareness of the pilot in the final approach segment of an IAP.

IAP designs should be kept as simple and standard as possible (for example, no offsets, RNAV MAPt at the runway threshold whenever possible, no SDFs and missed approaches straight ahead initially before any turns, etc).

Minimum obstacle data required

Non Precision Instrument Approach Procedure

- CAP 232 Aerodrome Survey Classification 1.
- DVOF obstacle data.
- Obstacle data obtained from spot heights captured from 50K and 250K base mapping, normally referred to as Manually Inserted Obstacles (MIO).

If it is apparent that there are trees in the vicinity of the manually inserted obstacle then an additional allowance of 30m shall be applied. Following a comprehensive study of current CAP 232 survey data, the CAA have concluded that this allowance is appropriate for trees.

This 30m allowance shall be applied in all designs to manually inserted obstacles where only the CAP 232 Aerodrome Survey Classification 1 is available.

Due to the limited data available in an Aerodrome Survey Classification 1, designers are required to utilise all available sources of data to fully assess the applicable procedure segments. The use of 50k and 250k OS mapping are essential whilst the use of Digital Terrain Modelling (DTM) and Google Earth are all valuable tools in assessing obstacles and the need for additional vertical allowances.

Instrument Approach Procedure with Vertical Guidance

- The requirements listed above; and
- CAP 232 Aerodrome Classification 2.

In the cases above, an on-site visit by a CAA APD shall be part of the IAP design process.

Methodology for the calculation of OCH for straight In approaches to non instrument runways

Conventional Non Precision IAPs with or without DME, and RNAV Non Precision IAPs:

- shall use as a minimum CAP 232 Aerodrome Survey Classification 1, DVOF and manually inserted obstacles, apply a tree allowance of 30m (if required) and apply standard Pans Ops minimum obstacle clearance (MOC) to obtain the procedure OCH.

IAPs with Vertical Guidance:

- shall use as a minimum CAP 232 Aerodrome Survey Classification 2, DVOF and manually inserted obstacles and apply standard Pans Ops obstacle assessment surfaces (OAS) to obtain the procedure OCH.

If any of the above calculated OCH is less than 500ft, then 500ft OCH shall be promulgated on the instrument approach chart. (500ft is the lowest OCH for visual manoeuvring for CAT B aircraft and this is accepted as best practice by industry today to runways that do not meet either non precision or precision instrument runway standard requirements).

Methodology for the calculation of OCA(H) for visual manoeuvring

Standard Pans Ops criteria shall be used.

If the dominant obstacle is a manually inserted obstacle with trees in the vicinity, then a 30m tree allowance shall be applied.

If the calculated min OCA(H) for visual manoeuvring is lower than the highest procedure minimum OCA(H) (there may be more than one procedure type at the aerodrome), then the published value shall be the highest procedure minimum OCA(H) at the aerodrome.

Case studies

Case study 1

Aerodrome A	
Operational Requirement	An IAP to Runway 25 based upon GNSS which will support scheduled public transport operations predominantly by fixed wing aircraft (Twin Otter and B.N. Trislander) serving a remote community.
Limitations In Aerodrome Environment	It is a grass aerodrome and thus it is not able to satisfy the requirements of CAP 168 regarding runway markings, signage and aerodrome ground lighting.

RNAV (GNSS) RWY 25

1. Pans Ops Doc 8168 design criteria applied.
2. MSA was constructed as normal with 300m MOC based on the ARP.
3. For simplicity a MSA based on the ARP is used instead of using TAAs. But if an aerodrome requested the use of TAAs this could be added to the design.
4. VMC was constructed using the standard criteria for the protection areas. As the dominant obstacle is a CAP 232 Aerodrome Survey Classification 1 surveyed obstacle, no additional allowances were applied.
5. The intermediate segment dominant obstacle is a DVOF obstacle therefore no additional allowances were applied.
6. The final approach segment dominant obstacle is a hill, which has no apparent vegetation on top or pylons in the vicinity. Therefore no additional allowances were applied.

Case study 2

Aerodrome B	
Operational Requirement	An IAP to Runway 27 based upon GNSS, and a conventional IAP based upon an NDB both of which will support non-commercial air transport operations by fixed wing aircraft (Cat A and B)
Limitations In Aerodrome Environment	The aerodrome has a hard runway but it does not satisfy all the requirements of CAP 168 regarding instrument runway markings, signage and aerodrome ground lighting.

NDB RWY 27

1. Pans Ops Doc 8168 design criteria applied.
2. Lack of runway lighting will signify that the IAP is not available at night and this will be noted on the IAC.
3. MSA was constructed as normal with 300m MOC based on the NDB.
4. VMC was constructed using the standard criteria for the protection areas. As the dominant obstacle is a CAP 232 Aerodrome Survey Classification 1 surveyed obstacle no additional allowances were applied. Due to intense gliding north of the airfield the published VMC minimum OCA(H) will be restricted to south of RWY 09/27. The calculated min OCA(H) for visual manoeuvring is lower than the procedure minimum OCA(H), therefore the published value is the same as the highest procedure minimum OCA(H) at the aerodrome.
5. The intermediate segment dominant obstacle is a manually inserted obstacle. There are trees in the vicinity therefore an additional 30m tree allowance was applied.
6. The dominant obstacles in the final approach and initial MAP are trees which had been surveyed as part of the CAP 232 Aerodrome Survey Classification 1, therefore no tree allowance was applied.
7. The intermediate MAP dominant obstacle is a manually inserted obstacle, and due to the trees in the missed approach area an additional 30m tree allowance was applied.

RNAV(GNSS) RWY 27

1. Pans Ops Doc 8168 design criteria applied.
2. Lack of runway lighting will signify that the IAP is not available at night and this will be noted on the IAC.

3. MSA was constructed as normal with 300m MOC based on the ARP.
4. For simplicity a MSA based on the ARP is used instead of using TAAs. But if an aerodrome requested the use of TAAs this could be added to the design.
5. VMC was constructed using the standard criteria for the protection areas. As the dominant obstacle is a CAP 232 Aerodrome Survey Classification 1 surveyed obstacle, no additional allowances were applied. Due to intense gliding north of the airfield the published VMC minimum OCA(H) will be restricted to south of RWY 09/27. The calculated min OCA(H) for visual manoeuvring is lower than the procedure minimum OCA(H), therefore the published value is the same as the highest procedure minimum OCA(H) at the aerodrome.
6. The intermediate segment dominant obstacle is a manually inserted obstacle. There are trees in the vicinity therefore an additional 30m tree allowance was applied.
7. The procedure altitudes at the IAF are based on the highest MSA. This is to ensure that a pilot commencing the procedure from the west will not be below the MSA. Even with reduced initial and intermediate segment lengths this is within criteria.
8. The dominant obstacles in the final approach and initial MAP are trees which had been surveyed as part of the CAP 232 Aerodrome Survey Classification 1, therefore no tree allowance was applied.
9. The intermediate MAP dominant obstacle is a manually inserted obstacle, and due to the trees in the missed approach area an additional 30m tree allowance was applied.

Charting and coding tables

Examples of standard IAP charts and coding tables can be seen in the UK AIP.

APPENDIX 3

Helicopter PINS approaches

General

ICAO Doc 8168 Volume II (PANS OPS) makes provision for Area Navigation (RNAV) Point-In-Space (PinS) approach procedures for helicopters using basic GNSS receivers. All approaches will be to a point in space where the pilot should have sufficient visual reference to continue the approach and landing to the intended landing site or initiate a missed approach.

The design criteria for a PinS approach is published in Pans Ops Vol II Part IV Helicopters Chapter 1. The design assumptions and calculation methodology of the procedure OCA(H) are contained in Appendix 2 to that document.

This appendix will be developed further as experience is gained in developing and approving PinS approaches in UK. This is in line with the incremental nature of the policy outlined in this guidance document.

SECTION 4, POST IMPLEMENTATION REVIEW:

CHAPTER 1

Ongoing monitoring and feedback

A specific ‘post implementation review’ phase will be an essential part of the risk-reduction activities identified during safety assessment, particularly during the early stages of implementation of an IAP using this risk-based policy. This review activity will allow lessons to be learnt from the initial operating phase which can be fed into the process for future applications and is therefore referred extensively in Chapter 2 ‘The Assessment and Management of Safety Risk’.

A key function of this activity is to provide ongoing feedback on the effectiveness of the procedures adopted for the IAP and, in particular, to provide continuous assurance that the alternative safety mitigations which were identified as necessary and sufficient during the safety analysis which was carried out in support of the application remain effective in practice. For aerodromes and ANSPs which are required by regulation to operate a SMS, this would represent a normal and everyday part of the function of an effective SMS. Where ongoing monitoring indicated that conditions had changed or that additional safety mitigations needed to be introduced to address changing safety trends this would be carried out and documented by the operator and would be subject to scrutiny by the CAA as part of normal oversight activities including inspections and audits.

The importance of the aerodrome operator’s arrangements for post-implementation and ongoing safety monitoring will play a key part in the CAA approval process. Particular attention will therefore need to be applied by applicants to conducting robust safety assessment of arrangements to meet Goal 1.7 of Chapter 3, ‘Implementation’, ‘The Assessment and Management of Safety Risk’’– “The risk of an accident during the through-life operation of an IAP at this aerodrome is acceptably low”. The CAA will need to be satisfied that applications for the establishment of IAP are supported with suitably robust arrangements for the gathering and reporting of data regarding operation of the procedures in practice and which would allow changes in risk exposure, for example related to the number and type of IAP users, levels of local traffic etc to be identified and acted upon to provide assurance that safety is being adequately managed. Similarly, arrangements for the gathering and reporting of safety data, in particular relating to safety-related events, would be an important consideration as would the applicant’s intended arrangements for periodic review and audit of IAP procedures and associated aerodrome conditions. Such arrangements would be expected to be proportionate to the levels of activity, numbers of instrument approaches flown etc.