CONSULTATION DOCUMENT FOR

THE INTRODUCTION OF

INSTRUMENT APPROACH PROCEDURES

TO RUNWAY 03

AT

CRANFIELD AERODROME

CONTENTS

Appendices

1 ABOUT THIS CONSULTATION

1.1 What is this consultation about?

1.1.1 This consultation is about the proposed introduction of new Instrument Approach Procedures (IAPs) to Runway 03[1] at Cranfield Airport to enable all-weather operations to be conducted safely and expeditiously. These are procedures which are published by the Civil Aviation Authority (CAA) in the United Kingdom Aeronautical Information Publication (UK AIP) for use by aircraft arriving at Cranfield Airport.

1.1.2 The introduction of the new procedures will provide a full instrument approach capability to Runway 03 which does not currently exist. The current IAPs require that when Runway 03 is in use, aircraft must make an instrument approach to Runway 21 followed by a visual circling manoeuvre to reposition onto final approach to land on Runway 03. A minimum height/altitude to fly this procedure is depicted on the relevant IAP chart. This is explained in detail, together with the options that have been considered, in the main text.

1.1.3 Cranfield Airport does not currently have a surveillance radar facility so it is necessary, on a day-to-day basis, for arriving Instrument Flight Rule (IFR) flights to carry out the whole of the published IAP.

1.2 Why is the consultation being carried out?

1.2.1 The CAA requires that where there is a significant change to procedures or the distribution of air traffic in the vicinity of an airport a consultation must be carried out, by the airport operator concerned, with both the airspace users who may be affected by the change and organisations representing those who may be affected on the ground by the potential environmental impact of the change.

1.2.2 Whilst current regulations do not demand that a formal consultation be undertaken for the introduction of new IAPs at Cranfield, in this case, it has been

[1] Note: Airport runways when built are referenced by a 2-digit number which is derived from the orientation of the runway relative to magnetic north. For example, if the runway is orientated on a bearing of 033/213°, the designation given to it would be 03/21. Runway 03 would require aircraft to depart/arrive on a north-easterly track (i.e. about 030°) and runway 21 would require aircraft to depart/arrive on a south-westerly track (i.e. about 210°). Where a runway orientation lies between 030° and 034° the designation is rounded down to 03. If the orientation lies between 035° and 039° the designation would be rounded up to 04. As magnetic variation changes annually, the runway orientation is reviewed and referenced accordingly, and form time to time the runway designation needs to be changed.

agreed with the CAA that it would be prudent to complete a consultation to demonstrate transparency of the requirement and to ensure that appropriate due process is exercised. Moreover, such a consultation (carried out by the airport operator) enables the CAA to meet its obligations under the Transport Act 2000 and the Directions given to the CAA by the Secretary of State for Transport.

1.3 Who is being consulted?

1.3.1 In the first instance, the affected parties from the aviation fraternity comprising commercial and private aircraft operators based at or using Cranfield Airport are consulted. In addition, operators of adjacent aerodromes and other aircraft operators who routinely might operate in the airspace in the vicinity of Cranfield Airport and might be affected by the change are being consulted.

1.3.2 In the second case, the non-aviation affected parties comprising County, District and Parish Councils over whose areas the proposed nominal track of the procedures lie are being consulted. In addition, certain specific environmental organisations are also consulted.

1.3.3 The Airport has formed an Airport Operators Forum which meets routinely every 3 months and its constituent members also meet under the auspices of the Airport Safety Committee. Initial internal consultation was with latter Committee on 22nd September and the proposal was well received. Further consultation with these on-airport stakeholders took place on 12th October 2011 at the Operators Forum and once again the feedback was positive. The membership of these 2 groups comprises: Airport Operator and Administration, Airport Fire Service, Cranfield University Estates and Site Services Department, Cranfield University Security, Cranfield Aerospace, ATC Operations and Engineering, AKA Aviation (Fuel), Cabair, Bonus Flying School and Engineering, Azure Flying Club, Eagle Air Flight Training, Cranfield Flying School, Billins Air Services, Cranfield Helicopters, Cranfield Handling and IAE Engineering. These independent organisations have been included in the list of consultees as shown in Appendix C.

1.4 Conduct of the consultation

1.4.1 The CAA requires that the consultation is conducted in accordance with the principles set out in the Cabinet Office Code of Practice on Consultation (http://www.bis.gov.uk/files/file47158.pdf).

1.4.2 Cranfield Airport staff attended a Framework Briefing given by the Directorate of Airspace Policy (DAP - a division of the UK CAA) to obtain advice and guidance on the process to be followed. The Airport Operator has appointed Cyrrus Limited to manage and co-ordinate the consultation process on its behalf. Cyrrus Limited is an airspace management consultancy company with extensive experience of managing Airspace Change Proposals and consultation to meet the CAA requirements.

1.4.3 This consultation document encompasses both the aviation and the environmental aspects of the proposed changes to procedures. The document is structured to give a clear and concise explanation of the proposed changes in plain language. Whilst aviation consultees will be familiar with the aeronautical terminology used, non-aviation consultees may not be so familiar with aviation terminology and practice; consequently, these aspects are explained in some detail where necessary. A Glossary of Terms is given at Appendix A.

1.4.4 The preferred methodology for consultation is through the Cranfield Airport Website, where a special link has been established to enable consultees and other interested parties to respond. Notwithstanding, individual copies of the consultation document can be distributed to consultees upon request. Consultees who prefer that the Sponsor Consultation document be sent in hard-copy should make the request to the focal point detailed in paragraph 1.7.

1.4.5 In Section 3 of this consultation document we explain in detail the limited options available to us. Each option outlines the operational matters arising and where applicable the environmental aspects. This section also details the conclusions we have reached in applying our balanced judgement to the development of safe and effective operating procedures.

1.4.6 In accordance with the Cabinet Office Code of Practice on Consultation and the CAA's requirements, a period of 12 weeks is normally allowed for consultation. However, given that the proposed consultation period spans the 2011/12 festive break, we have decided to extend the consultation period to enable consultees adequate time to respond. Thus the Consultation period starts on 27 October 2011 and is planned to close on 25 January 2012.

1.4.7 Within this period we ask you, or the organisation you represent, to consider the proposed changes and the options that we have considered and submit your

responses to us. Even if you have no comment to make on the proposed changes, we would still appreciate a response to that effect. Details of how to respond are shown on the website at http://www.cranfieldairport.com/ and at paragraph 1.7.

1.5 Results of the Sponsor Consultation

1.5.1 We will be monitoring the responses as they come in to us. If we need clarification of any comments you have made we will contact you.

1.5.2 At the end of the consultation period we will analyse the responses received and prepare a formal submission for the CAA DAP. Subsequently, DAP will follow their regulatory process and, if they are content with the consultation, implement the proposed procedures. Subject to the satisfactory conclusion of the consultation, it is anticipated that the proposed procedures would be introduced on 28 June 2012 in accordance with international requirements for the promulgation of aeronautical information.

1.5.3 We will also publish a brief report of the consultation on the Cranfield Airport website at http://www.cranfieldairport.com/ .

1.6 What this Sponsor Consultation is not about

1.6.1 Finally, it is appropriate to tell you what is not included in the scope of this Sponsor Consultation.

1.6.2 This consultation is not about any aspect of Government Airports Policy nor the future development of infrastructure or the business model at Cranfield Airport.

1.6.3 This consultation is not about safety; although a safety assessment for the introduction of the new procedures will be undertaken to ensure they satisfy the safety criteria associated with the IAP design process. All IAPs are designed to international procedure design criteria (contained within ICAO Doc 8168 PANS-OPS) which assure the safety of operation of aircraft and are approved and published by the CAA. The safety of the air traffic management system is regulated by the CAA.

1.6.4 This consultation is not about departing aircraft or Noise Preferential Routes.

1.6.5 This consultation is not about controlled airspace or the establishment thereof. However, in designing the proposed IAPs we are cognisant of controlled airspace

and the air operations of other aerodromes in the vicinity of Cranfield Airport and have taken these factors into account.

1.6.6 We are aware that a number of consultations have been carried out in recent years by London Luton Airport and by NATS about the establishment of controlled airspace associated with London Luton Airport and over the south-east region in general. Many of our consultees will have been involved in those consultations. This consultation is not associated with any other airspace consultation.

1.6.7 Any comments on the above issues which may be included in your responses will be noted but discounted from the analysis. Notwithstanding such comments will be forwarded to the regulatory authorities in their original form and without further attachment or opinion being expressed by the Sponsor.

1.7 Focal Point for this Consultation

1.7.1 Your responses to this consultation, or any queries you may have, should be addressed to:

(ACP 2012 - Sponsor Consultation)
First Floor Offices
Hangar 1
Cranfield Airport
Cranfield
Bedfordshire MK43 0LA

Tel: 01234 758152
e-mail: consult@cranfield.ac.uk

1.7.2 The discrete e-mail address listed above is the preferred method for you to raise any queries on the content or conduct of this consultation.

1.8 Confidentiality

1.8.1 The CAA requires that all consultation material, including copies of responses from consultees and others, is included in any formal submission to the CAA of an Airspace Change proposal.

1.8.2 Cranfield Airport undertakes that, apart from the necessary submission of material to the CAA and essential use by our consultants for analysis purposes, Cranfield Airport will not disclose personal details or content of responses and submissions

to any third parties. Our consultants are signatories to confidentiality agreements in this respect.

1.9 CAA Oversight

1.9.1 The CAA DAP maintains oversight of the conduct of the consultation being carried out by Cranfield Airport to ensure that we adhere to the process laid down in CAP 725. If you have any complaints about Cranfield Airport's adherence to the consultation process these should be referred to:

Head of Business Management
Directorate of Airspace Policy
CAA House
45 - 59 Kingsway
London WC2B 6TE
e-mail: businessmanagement@dap.caa.co.uk

It is emphasised that DAP will not comment to consultees on the proposal itself.

2 CRANFIELD AIRPORT OPERATIONS

2.1 Overview

2.1.1 Cranfield Airport was first established as a military aerodrome in 1936 and was operational, mainly as a training unit, throughout the Second World War. In 1946 the aerodrome became the site for a new College of Aeronautics (known today as the School of Engineering) which forms part of the current Cranfield University that owns and operates the aerodrome as a civil licenced airport.

2.1.2 Historically, aircraft operations at Cranfield Airport were mainly research-based in association with the College and flying training operations by Flying Schools based at the Airport. However, in recent years there has been a diversification of operations and a movement towards greater use by business and executive aircraft.

2.1.3 The current published hours of operation of the Airport are 0830 to 1930 (Local time) Monday to Friday and 0900 to 1800 at weekends and Public Holidays.

2.1.4 It should be noted that although this consultation is about the introduction of new IAPs to Runway 03 where none currently exist, IAPs to this runway have existed in the past. However, the procedures were withdrawn at least 10 years ago due to a significant reduction in the types of aircraft operations that would require the use of the IAPs. However, there has been a resurgent demand for IAPs to be established on this runway once again in order to assure continuity of operations for traffic in all weather conditions.

2.2 Air Traffic Movements and Forecast

2.2.1 The number of aircraft movements at Cranfield has been affected by the current economic downturn as evidenced by the figures for the last 5 years set out in Table 2-1.

2.2.2 Flying training continues to be the mainstay of the traffic movements and is undertaken by various companies. Notwithstanding, to improve the use of Cranfield Airport, permission to develop an Air Park was requested and granted and this provides both aircraft maintenance and customer-related facilities for the executive and business operators. Overall this facility provides a high quality environment that visitors using private aviation at Cranfield find efficient and an enjoyable experience. Moreover, this facility and the development of the new IAP

will prove most beneficial to any visitors we may attract as a designated over-spill airport for the Olympic Games.

	Totals	%	IAP 21 (70%)	IAP03 (30%)
2007				
IAP (b)	5500	7.4	3850	1650
Non IAP (c)	69031	92.6		
Total (a)	**74531**			
Transit (d)	7903			
2008				
IAP (b)	5470	7.6	3829	1641
Non IAP (c)	66145	92.4		
Total (a)	**71615**			
Transit (d)	7904			
2009				
IAP (b)	5226	9.1	3658	1568
Non IAP (c)	52267	90.9		
Total (a)	**57493**			
Transit (d)	7748			
2010				
IAP (b)	4659	9.5	3261	1398
Non IAP (c)	44145	90.5		
Total (a)	**48804**			
Transit (d)	6651			
2011				
IAP (b)	3303	8.3	2312	991
Non IAP (c)	36482	91.7		
Total (a)	**39785**			
Transit (d)	5747			

Notes for Table 2-1:

a) - Total Movements Relate to those aircraft which actually utilise the runway at Cranfield

(b) - IAP Movements are those which conduct an Instrument Approach Procedure to land at Cranfield

(c) - Non IAP Movements are those that utilise the runway at Cranfield without an Instrument Approach.

(d) - Transit traffic figures are those aircraft which operate in the vicinity of and through the Cranfield ATZ.

The 2011 figures are correct up to the end of September.

Table 2-1: Aircraft Movements 2007-2011

2.2.3 Only the total number of IAPs flown is presented in Table 2-1. As can be seen less than 10% of the total movements utilise an IAP to make an approach to the Airport. Under the current arrangements all of the IAPs make an approach on Runway 21 even when operating on Runway 03. For convenience, the total IAPs have been sub-divided to the 2 runways to give an indication of how many aircraft fly approaches that result in a landing on Runway 03. If the change proposal is approved, it can be seen that there is potential for a significant reduction in the number of instrument approaches made to Runway 21.

2.2.4 It should also be recognised that there are a large number of aircraft which transit through the Class G airspace carrying out legitimate flying activities. No restrictions can be imposed on these flights other than those set out in the Air Navigation Order. Whilst some of the pilots contact Cranfield Air Traffic Control to make them aware of their presence many do not and there is nothing to compel

them so to do. Consequently it should be recognised that there will be many instances where a variety of aircraft might fly through the airspace within which we wish to establish the IAP over which we have no direct control. The change we wish to make to the airspace arrangements (i.e. establish IAP within Class G airspace) is not unusual and exists at several similar airfields throughout the UK, for example at Blackbushe, London Oxford and Farnborough. The presence of the IAP for Runway 03 is not anticipated to make any difference to the type and level of traffic transitting through local airspace.

2.3 Local Airspace

2.3.1 Cranfield Airport is situated outside of controlled airspace (i.e. in Class G airspace) which lies above and adjacent to the Airport. The airspace in the immediate vicinity of the Airport is protected by an Aerodrome Traffic Zone (ATZ) of 2 nautical mile (NM) radius and to a height of 2000ft above the Airport. Aircraft must obtain permission from Cranfield ATC to enter the ATZ. An explanation of the classification of UK airspace is provided at Appendix A.

2.3.2 Although outside controlled airspace itself, the Airport lies in close proximity to the controlled airspace of London Luton Airport to the south, the Daventry Control Area (CTA) to the north-west and the London Terminal Control Area (LTMA) to the south. This is shown in Figure 2-1.

2.4 Type of Air Traffic Services

2.4.1 Air Traffic Services (ATS) are provided on behalf of Cranfield Airport by a third-party Air Navigation Service Provider (ANSP) approved by the CAA. The ATS include Aerodrome Control Service (ADC) ("Cranfield Tower") and Approach Control Service (APC) ("Cranfield Approach"). The ADC Service provides the ATS to aircraft on the ground and in the immediate vicinity of the aerodrome. The APC Service provides the ATS to arriving and departing IFR and VFR flights and to transit aircraft where requested so to do.

2.4.2 No ATS Radar Surveillance capability currently exits at Cranfield Airport. Thus the ATS provided is "Approach Control Procedural Service". Under this type of service, aircraft are separated vertically or by time intervals based on position reports given by pilots, instructions given by ATC and expectation that pilots will adhere to the notified Instrument Flight Procedures. This is explained in more detail in Section 3.

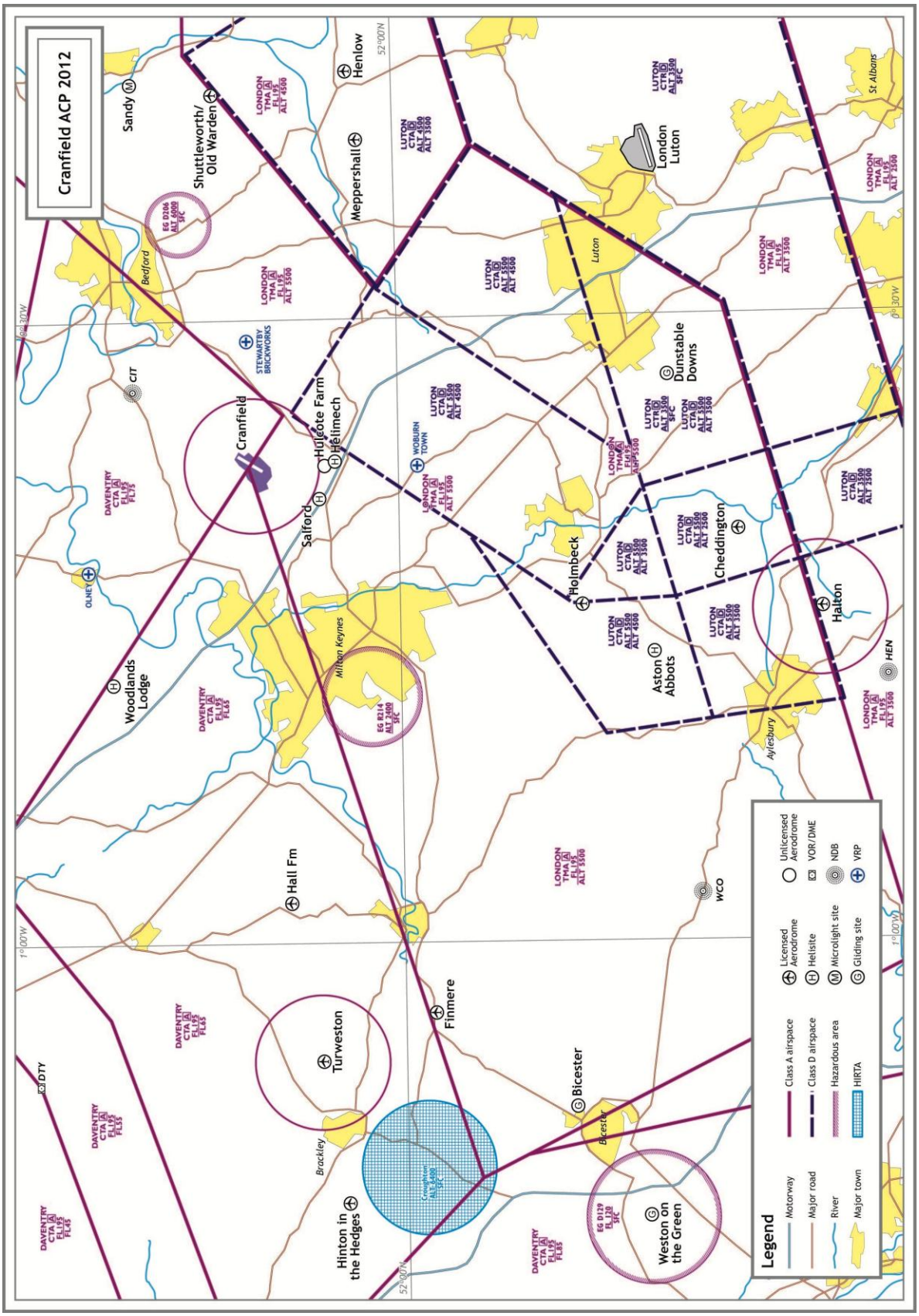


Figure 2-1: Current Local Airspace Arrangements

2.5 Airport Development

2.5.1 As noted in paragraph 2.1.2, Cranfield Airport has seen a diversification of operation towards business and executive operations and the opportunity for this area of aviation activity is expected to increase as such operations are gradually squeezed out of the major airports in preference to airline operations. The pressure on the capacity of the runways available in the local region has been articulated widely and Cranfield would be able to play its part to provide some welcome relief.

2.5.2 In recognising this potential growth area Cranfield Airport has been granted planning permission to establish an Air Park facility. This aviation sector requires access to good quality parking, hangarage and aircraft handling facilities. The aircraft operators also require the provision of aeronautical facilities to ensure that there is more certainty of completing approaches in all weather conditions. Consequently, Cranfield Airport is seeking to provide optimal IAPs to both runways to promote the safe and expeditious movement of air traffic.

2.5.3 A number of associated works are also taking place at the Airport to ensure that the appropriate infrastructure is available to support business aircraft operations. These improvements include the installation of enhanced approach lighting and changes to the runway environment. These changes will be completed in time for the introduction of the new IAPs to Runway 03.

2.6 Timetable Drivers

2.6.1 Cranfield Airport has been designated as an overspill airport to handle business and executive type aircraft carrying passengers attending the 2012 Olympic Games. This does <u>not</u> imply a significant or permanent increase in commercial air transport flights, but it is expected that there may be a slight increase in the use of the Airport by business aircraft during the Olympic Games period.

2.6.2 In order to assure continuity of operations under all weather conditions during the Olympic period it is necessary for the new IAPs and the associated surface works to be completed in good time. This dictates the timetable for the planned introduction of the new IAPs on 28 June 2012.

3 PROPOSED NEW IAP

3.1 What are Instrument Approach Procedures?

3.1.1 IAPs are procedures by which arriving flights, operating under the IFR, can carry out a prescribed set of manoeuvres which will place the aircraft in a suitable position on the final approach path to the runway from which a landing can be completed. Such procedures are published by the CAA, for all airports in the UK where they are applicable, in the UK AIP.

3.1.2 IAPs may be based on a variety of ground-based or space-based navigation aids. In the case of Cranfield Airport, a VHF Omni-Directional Radio Range (VOR)[2] coded "CFD" located on the Airport and a Non-Directional Beacon (NDB) coded "CIT", located 3.6NM north-east of the Airport, currently provide the focal points for the procedures and the terminal holding facility. The other facilities provided include an Instrument Landing System (ILS) on Runway 21, supported by Distance Measuring Equipment (DME) and a VHF Direction Finder (known as VDF) equipment located on the Airport. Surveillance Radar facilities are not currently installed and, therefore, air traffic control radar surveillance services cannot be provided. The existing IAPs are shown at Appendix B.

3.1.3 Currently, all of the IAPs for Cranfield Airport are aligned on Runway 21. No IAPs are published for Runway 03; hence this consultation is about the proposed introduction of new IAPs for Runway 03.

3.2 How are IAPs used?

3.2.1 It is emphasised that Cranfield Airport does not have a Surveillance Radar capability which would provide radar-directed routing of inbound aircraft towards the final approach track. All instrument approaches are carried out by means of pilot-interpreted navigational procedures using the published IAPs in full. Separation of successive IFR flights inbound to Cranfield Airport and separation of inbound flights from outbound flights is achieved by Cranfield Approach issuing instructions to aircraft based on position reports given by the pilots of participating aircraft in accordance with established UK ATC procedures.

3.2.2 Under normal day-to-day operations the pilot of an inbound aircraft would fly to overhead the "CFD" VOR or "CIT" NDB as appropriate and then carry out the pre-

[2] The VOR installation is owned and operated by NATS Ltd and is planned to be withdrawn in 2012 in accordance with established CAA Policies.

determined manoeuvres published in the respective IAPs. This would result in the alignment of the aircraft with the runway in use and in such a position from which a landing can be completed with visual reference to that runway.

3.2.3 Runway selection at most airports is determined by the wind direction and speed. At Cranfield Airport, Runway 21 is used approximately 70% of the time and Runway 03 at other times. Because all of the current IAPs are aligned on Runway 21, when the prevailing weather conditions require Runway 03 to be used for landing the pilot must carry out a Circling Approach. This means that the pilot must carry out an approach to Runway 21 until he/she has sight of the runway and then carry out visual manoeuvres below cloud to reposition onto the final approach to Runway 03. Although safe, this manoeuvre is an inefficient method of operating, particularly in poor weather, and can lead to extensive delays to successive inbound flights and to aircraft awaiting departure.

3.2.4 The use of the Circling Approach procedure is dependent on the cloud base and visibility being acceptable (i.e. within defined criteria). The minimum height at which the manoeuvre can be carried out is dependent on the category (size and performance capability) of the aircraft and, for smaller aircraft, may be as low as 450ft above the aerodrome. Circling to land is considered more difficult to fly and not as safe as a straight-in landing, especially when the cloud base is low and visibility poor. This is because the aircraft (whatever its size) has to fly at a relatively low altitude and must remain within a short distance (often only a few kilometres) from the airport in order to be assured of obstacle clearance. In any case, the pilot must maintain visual contact with the runway at all times as loss of visual contact means that the pilot can no longer continue the approach and will result in an immediate climb to the published safe altitude.

3.2.5 Holding is normally used when one or more aircraft need to wait for an improvement in the weather to enable a landing or if the runway becomes blocked. Also, training aircraft sometimes need to practice holding and this routinely happens at Cranfield. The holds are depicted on the IAP charts shown at Annex B. No changes to the holding patterns or the procedures for entering the hold are required as the design of the new procedures is predicated on the current footprint of the hold and uses existing holding procedures.

3.3 What changes are being proposed?

3.3.1 The proposal by Cranfield Airport is to introduce two new IAPs to support IFR operations on Runway 03. The first proposal is to introduce a conventional NDB/DME procedure similar to that currently published for Runway 21. At the same time, it is intended to introduce an Area Navigation (RNAV)[3] procedure based on satellite (GNSS/GPS) navigation.

3.3.2 RNAV procedures, using space-based navigation technology, are common-place throughout Europe and are progressively being introduced at aerodromes around the UK as selected ground-based navigation facilities are withdrawn in accordance with established international and UK navigation policies. The RNAV procedures offer improved aircraft operating efficiencies and better utilisation of the airspace as well as environmental benefits.

3.3.3 In the case of the proposed RNAV (GNSS) IAP to Runway 03, it will enable pilots of inbound IFR flights to route directly towards the Runway final approach track without having to first route to the VOR or NDB and carry out complex manoeuvring. It will also enable pilots to plan their descent profiles more efficiently prior to joining the final approach track thus avoiding lengthy level flight segments at low altitudes. Subject to the constraints of the surrounding controlled airspace, pilots will be able to plan Continuous Descent Approach (CDA) techniques which will reduce fuel burn and minimise noise exposure to communities on the ground.

3.3.4 The main benefit of introducing IAPs to Runway 03 is that it will eliminate the need for visual manoeuvring by aircraft at low-level after completion of an instrument approach to Runway 21. This will significantly reduce any noise impact of aircraft operations on communities in the immediate vicinity of the Airport when weather conditions dictate the use of Runway 03.

3.4 How are the IAPs designed?

3.4.1 IAPs are designed by specialist procedure designers in accordance with internationally agreed design criteria (known as PANS-OPS) which assure safe flyability by all categories of aircraft using the procedures and safe clearance from obstacles and terrain. Both the specialist procedure designers and the procedures themselves are approved by the CAA. Whilst in some cases there is

[3] RNAV aRea NAVigation

flexibility in the “style” of the procedures available for a given navigation aid, within each “style” the design parameters are tightly defined.

3.4.2 In determining what we believe to be the best options for the development of the proposed IAPs, we are required to consider in detail both the operational and the environmental effects of all of the options available and reach a balanced judgement as to which are the most suitable. Environmental considerations are considered more fully in Section 4.

3.4.3 In consideration of the design, we have taken particular account of the built up area of Milton Keynes and the adjacent controlled airspace as described in paragraph 2.3.2. There are no specially designated environmentally-sensitive areas identified in the vicinity of Cranfield or adjacent to the nominal track of the IAP design which require specific consideration or evaluation.

3.4.4 It is important to emphasise that the diagrams depicting the procedures represent the nominal track of the procedure. There are navigational tolerances associated with each navigational aid and it should be recognised that there are also other variable factors to be accounted for such as:

- Individual aircraft size and speed;
- Weather conditions pertaining at the time;
- Pilot experience and skill.

Thus, except for a precision approach track (i.e. ILS), there may be some variation in the actual path across the ground that successive aircraft may follow; but it will always be within the tolerances for the safe operation of the aircraft. That said the accuracy of the GNSS is such that the repeatability of the track should be very good.

3.5 What options have been considered?

3.5.1 Cranfield Airport is cognisant of the fact that the airport-sited VOR would provide better navigational accuracy for IAP design and track-guidance than the off-airport NDB. Consideration had been given to the introduction of a VOR approach to Runway 03 and some preliminary design work carried out. However, the VOR facility is a NATS installation and is not owned nor operated by Cranfield Airport. NATS has announced its intention that, in accordance with international and UK

agreed policies, the VOR is to be withdrawn in 2012 as it is no longer required for en-route or terminal airspace navigational purposes[4]. Thus we have taken the decision not to proceed with the introduction of a VOR-based procedure.

Conventional NDB/DME IAP

3.5.2 With respect to the proposed configuration of the conventional NDB/DME procedure to Runway 03, a limited number of options are available. It would be possible to design the procedure with the outbound leg and base turn either to the north side (see Figure 3-1) or the south side (see Figure 3-2) of the final approach track.

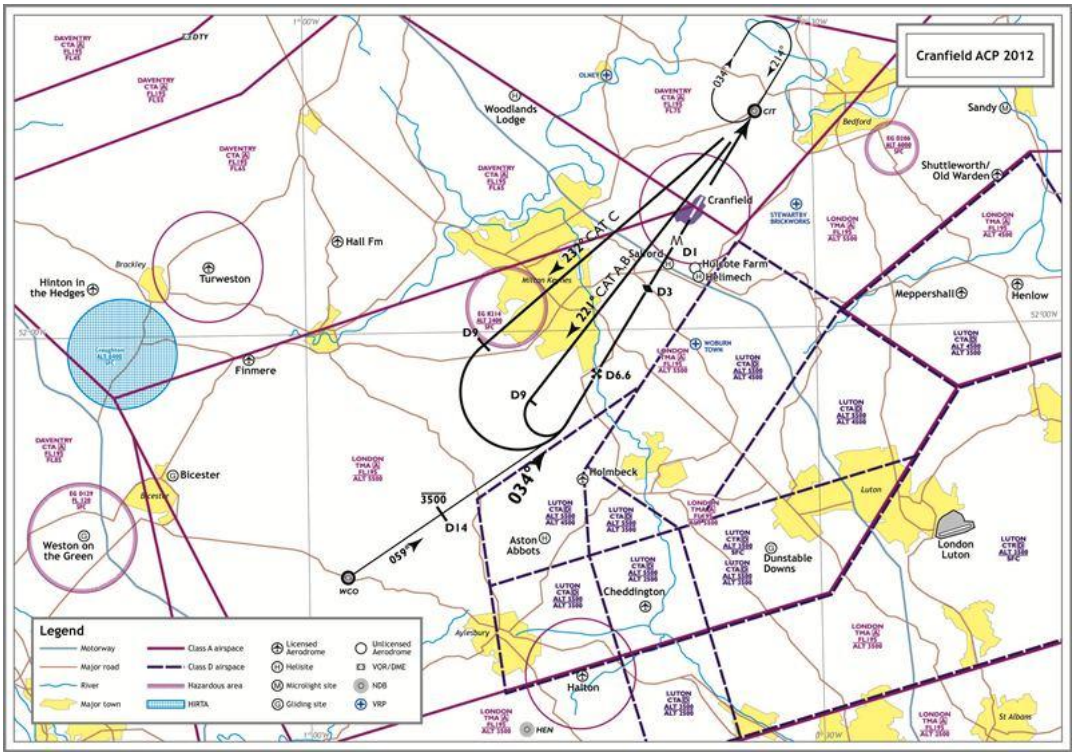


Figure 3-1: Nominal Tracks for the Runway 03 NDB/DME IAP

3.5.3 Cranfield Airport recognises that with the proposed procedure design (i.e. the outbound leg and base turn to the north side of the final approach) arriving IFR flight would overfly the conurbation of Milton Keynes whilst descending from 3500ft altitude to 2500ft altitude before turning inbound to join the final approach track. However, in considering the alternative option of designing the outbound

[4] The whole of the UK En route ATS Route structure is now based on RNAV and does not require the continued large-scale provision of ground-based navigational facilities.

leg to the south, we have to consider the potential impact of the design on aviation activities in general.

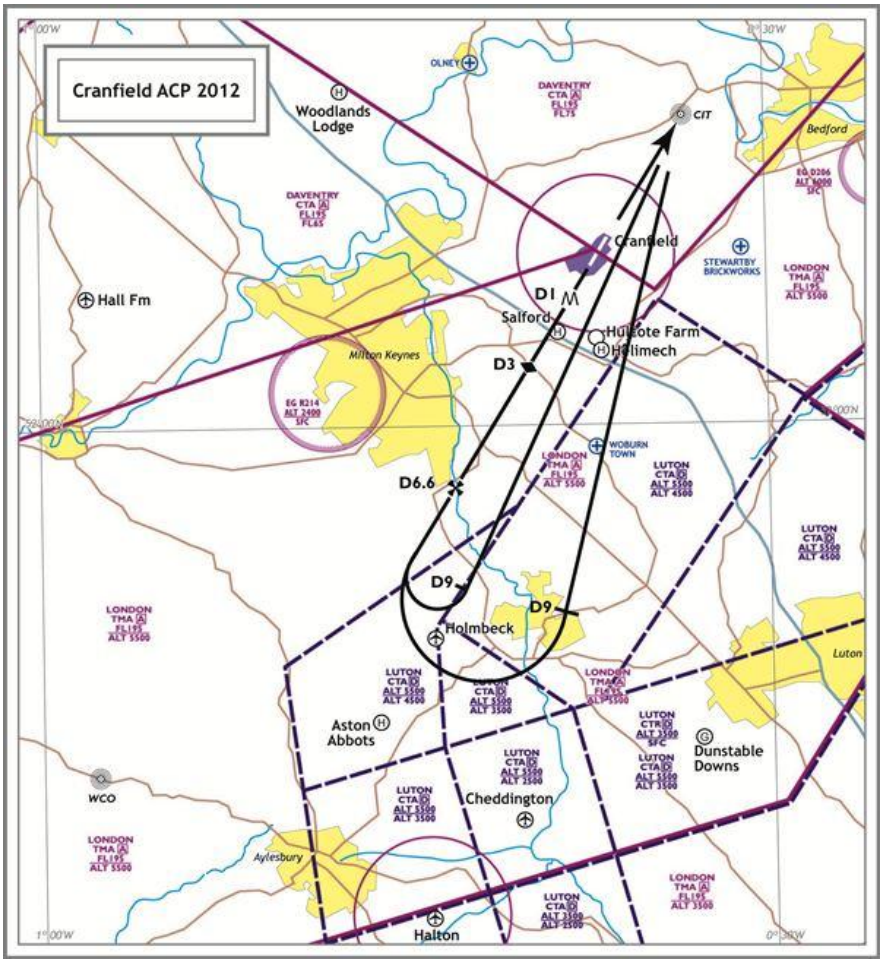


Figure 3-2: Positioning of the NDB/DME IAP south of Cranfield

3.5.4 Whilst the nominal track of the procedure itself would lie beneath the Luton CTA (which has a base level 4500ft amsl), there are technical design issues to be considered. For example, the procedure design protection areas have to be taken into account and those associated with the outbound leg and base turn are of such a size that they would infringe the Luton CTR to the south-west if the intermediate segment of the approach was established south of the final approach. Additionally, there is known to be more intensive aviation activity beneath the Luton CTA (base levels 4500ft and 3500ft amsl) than is operating legitimately beneath the LTMA (base level 5500ft amsl), but not in communication with nor known to Cranfield ATC. Consequently the risk of encounter with itinerant aircraft whilst conducting an instrument approach in confined airspace

would be greater. As mentioned previously, Cranfield does not enjoy the availability of surveillance radar which might mitigate these identified conflictions.

3.5.5 Thus, on balance, we have concluded that the proposed NDB/DME procedure (as shown in Appendix D) should be designed with the outbound leg and base turn to the north of the final approach track.

3.5.6 Additionally for the NDB/DME procedure, we have incorporated a track from Westcott (WCO) NDB to join the final approach track. This will assist pilots inbound from the west in navigating directly to the final approach, avoiding the need to route to overhead the NDB (to the north-east of the Airport) and then following the full procedure back towards the southwest to join the final approach track. This will result in significant fuel savings for flights inbound from the west. However, it should be noted that the continued provision and support of the Westcott NDB by NATS is not assured in the long-term.

RNAV GNSS IAP

For the RNAV procedure the options for the procedure design prior to joining the final approach track are limited by the adjacent controlled airspace. Consequently, in discussion with the CAA, it has been decided that the normal full array of “T” or “Y” Initial Approach Segments (as shown in Figure 3.3) will not be provided to either side of the final approach track.

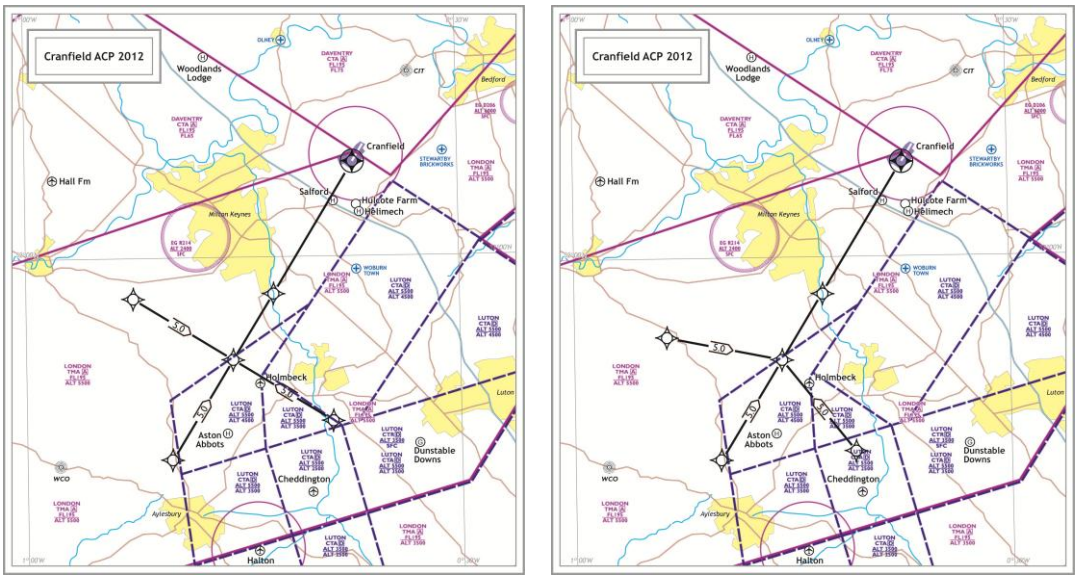


Figure 3-3: Standard T and Y shape GNSS IAP Layout

3.5.7 Instead only a segment of the "Y" configuration to the north of the final approach track will be used, providing Initial Approach Waypoints aligned on the track from WCO NDB and 45° offset to the north (as shown in Figure 3-4). The advantage of this design is that it will improve the ability for aircraft inbound from the west to remain as high as practical for as long as possible and avoid having to "step down" to remain beneath the Luton CTA with 4500ft altitude base level.

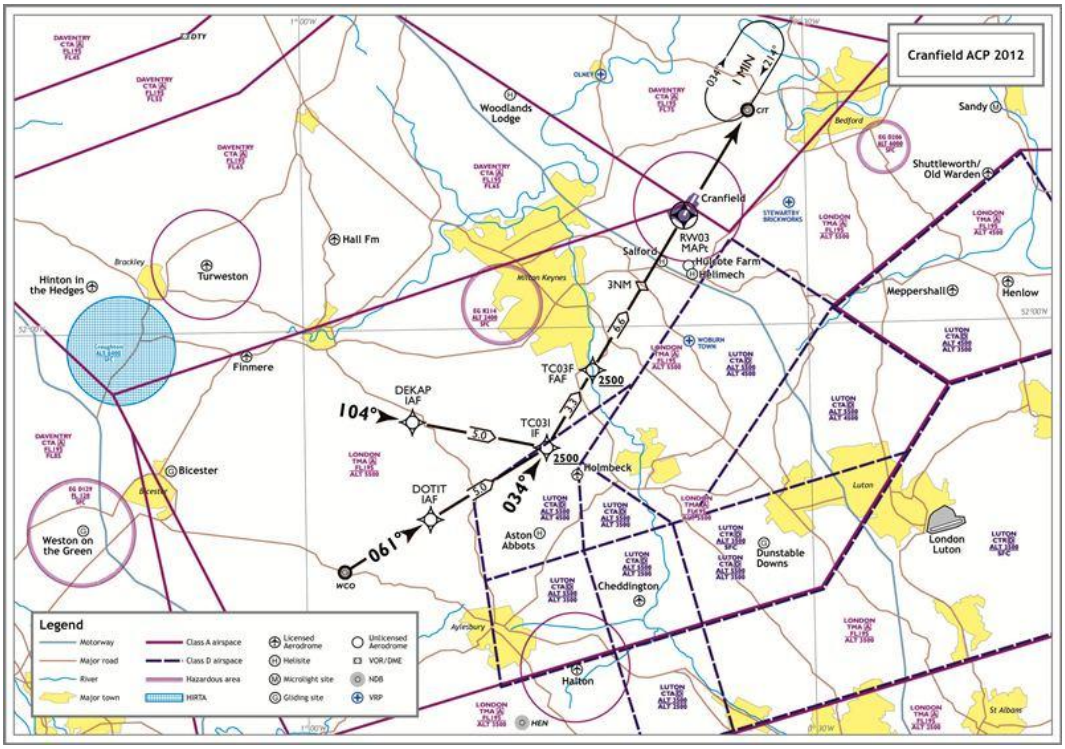


Figure 3-4: Proposed Layout of RNAV GNSS IAP

3.5.8 The design of the proposed RNAV GNSS is depicted at Appendix D.

3.6 Effect of this proposal on other Aerodromes and Airspace Activity

3.6.1 General: In considering the operational aspects of the proposed IAPs and the options available, we are required to consider the implications for the operations of other aerodromes in the locality and their operating procedures.

3.6.2 Under the notified airspace Rules, aircraft are permitted to operate freely in Class G airspace without reference to any ATC Unit. Many airspace activities take place in Class G airspace including flying training, gliding, hang-gliding and other leisure aviation activities as well as commercial and military flights. Many pilots elect to participate in radar surveillance services provided by suitably-equipped

ATS Units and will thus be made aware of aircraft in their proximity which may be operating under the IFR; however, such services are not available from Cranfield.

3.6.3 Similarly there are many IAPs notified in Class G airspace for aerodromes which do not have the benefit of the protection of controlled airspace. Aerodromes in Class G airspace having notified IAPs are annotated on aeronautical charts so the pilots of itinerant aircraft are aware that such procedures exist and can take them into account in planning and conducting their flights. Consequently, it is expected that good airmanship will prevail and that pilots would be vigilant and keep a good look out when transitting through the nominal flight path of a notified IAP.

3.6.4 Cranfield Airport is conscious of the wide range of aviation activity which takes place below and in proximity to the nearby controlled airspace and has taken this into account in the design of the proposed procedures. As noted in paragraph 3.5.3, the base turn procedure for the proposed NDB/DME IAP is oriented beneath the London TMA with base level 5500ft amsl rather than beneath the Luton CTR with base levels 4500ft and 3500ft amsl. Similarly the Initial Approach tracks of the proposed RNAV IAP have been kept below the higher based LTMA rather than below the Luton CTA.

3.6.5 VFR flights passing close to Cranfield Airport in a north/south routing may often use the M1 Motorway as a navigational line feature, and keeping the Motorway on the left in accordance with Rule 5 of the Rules of the Air Regulations (RotAR). The M1 motorway lies approximately ¼NM outside the Cranfield ATZ. Whilst there is no statutory requirement for such flights to communicate with “Cranfield Approach”, provided they remain outside the ATZ, good airmanship dictates that the majority of transit flights do communicate. Therefore, it must be recognised that where the final approach flight-path of the Runway 03 IAP crosses the M1 motorway it is possible that the aircraft will cross the path of the itinerant traffic. Similar encounters exist every day in the UK, but the ‘see and avoid’ principle is readily employed. The IAP will be published in the authoritative document (UK AIP) so pilots will be able to self-brief about the possibility of such encounters and either be extra vigilant in their lookout and/or contact Cranfield ATC for traffic information. Moreover, the modern business and executive aircraft are fitted with ‘collision avoidance systems’ which provide an additional safety aid to pilots.

3.6.6 Cranfield Airport considers that the risk associated with potential conflict in marginal weather conditions would be reduced with the availability of IAPs to

Runway 03 in comparison with the current procedure of visual manoeuvring after an approach to Runway 21. In the current scenario, the pilot's concentration would be very much focussed on visual reference to the runway itself rather than on lookout for other unknown aircraft. Furthermore, the itinerant aircraft following the M1 Motorway might be encountered by the IFR flight in a "head on" or "tail on" situation on the base leg or on final approach. Conversely, with the provision of formal IAPs to Runway 03, the arriving aircraft would be correctly stabilised on the approach, both vertically and laterally, from the Final Approach Fix (FAF) at 6.6NM from touchdown and, on emerging from cloud the pilot would be in a much better position to rapidly assimilate and react to the presence of an unknown VFR flight crossing the final approach track. Moreover, the period of conflict between an itinerant aircraft crossing the final approach track would be much reduced from the period of conflict with an aircraft carrying out visual manoeuvring.

3.6.7 Luton Airport: London Luton Airport is a major UK airport handling commercial air transport flights. In the main, all flights inbound to and outbound from London Luton Airport are contained wholly within controlled airspace and therefore will not be in conflict with the proposed IAPs for Cranfield. However, some general aviation activity also takes place from London Luton Airport which transits through and conducts its activity within Class G airspace. Such flights will be aware of the existence of the Cranfield IFPs through notification of the procedures in the UK AIP and annotation on aeronautical charts.

3.6.8 Dunstable Downs: Dunstable Downs is a gliding site situated to the west of London Luton Airport and conducts a high level of gliding activity including long range cross-country flights. Such flights routinely operate below controlled airspace over a wide area. The risk of encounter between gliders and powered aircraft outside controlled airspace (whether or not the powered aircraft are carrying out IAPs) is considered acceptable by the CAA and collision avoidance is effectively managed through the application of the Rules of the Air. Pilots of gliders operating from Dunstable Downs (or other gliding sites) will be aware of the existence of the proposed IAPs through their notification in the UK AIP and annotation on aeronautical charts and will apply good airmanship in their flying activities to mitigate any potential encounter with an aircraft flying an IAP to Runway 03 at Cranfield.

3.6.9 Holmbeck Farm Airstrip: Holmbeck Farm is an unlicensed grass airstrip lying approximately 10NM SSW of Cranfield Airport and beneath the Luton CTA (where the base level is 3500ft amsl). The Airstrip has an elevation of 420ft amsl and a circuit height of 800ft above the aerodrome level (i.e. 1220ft amsl). A number of locally-based light aircraft operate from Holmbeck Farm and aircraft up to light-twin (e.g. PA-31) can be accommodated. All operations are conducted under VFR, there are no instrument flight procedures notified or promulgated for this air strip.

3.6.10 The nominal final approach track of the proposed IAPs to Runway 03 at Cranfield Airport lies approximately 1.5NM north-west of Holmbeck Farm (at approximately 10nm from touchdown), at which point aircraft carrying out the IAP are not below 2500ft ALT. Furthermore, the base turn procedure for the NDB/DME procedure lies to the north of the final approach track – away from Holmbeck Farm.

3.6.11 Thus it is considered that there is adequate de-confliction between aircraft carrying out RNAV or NDB/DME approaches to Runway 03 at Cranfield and aircraft operating in the vicinity of Holmbeck Farm Airstrip.

3.6.12 Aston Abbots Helipad: Aston Abbots Helipad is a privately operated unlicensed helicopter landing site approximately 3NM southwest of Holmbeck Farm airstrip (approximately 13NM SSW of Cranfield Airport) and beneath the Luton CTA (where the base level is 3500ft amsl). The Initial Approach leg of the proposed RNAV IAP to Runway 03 at Cranfield Airport lies approximately 3NM north-west of the helipad at which point aircraft carrying out the IAP must be not below 2500ft altitude. It should be noted that aircraft carrying out a properly managed CDA would normally be above 4000ft altitude at this stage of the approach. The proposed NDB/DME approach to Runway 03 does not extend as far as the vicinity of Aston Abbots helipad. Therefore, it is considered that no confliction would exist between aircraft carrying out the proposed IAPs to Runway 03 at Cranfield and helicopters operating in the vicinity of Aston Abbots Heliport.

3.6.13 Hulcote Farm Airstrip and Helimech Helipad: Hulcote Farm Airstrip is a privately owned unlicensed grass airstrip sited close to the M1 Motorway approximately 2½NM south of Cranfield Airport. Helimech helicopter landing site is adjacent and to the south of Hulcote Farm. Both sites lie just outside the Cranfield ATZ. Radio equipped aircraft/helicopters operating to/from these sites would normally contact Cranfield ATC if operating to the north of the sites and a normal ATC service

would be provided in respect of other traffic known to Cranfield ATC. The sites are well to the south of the final approach track for the proposed IAPs and the existence of the proposed IAPs would cause no constraint on the operation of the two sites. Pilots of non-radio equipped aircraft/helicopters operating to/from these sites would be aware of the existence of the proposed IAPs through notification in the UK AIP and by briefing by the aerodrome/helipad operators.

3.6.14 Salford helipad: Salford helipad is a privately owned unlicensed helicopter landing site which lies almost exactly on the final approach track to Runway 03 at Cranfield Airport at a distance of 1.85NM from the Runway 03 threshold. It lies just outside the Cranfield ATZ. Appropriate procedures are in place for the integration of helicopters operating to/from Salford helipad and aircraft operating in the vicinity of Cranfield Airport. Thus an adequate means exists to pass appropriate traffic information, both to helicopters operating under VFR and to IFR flights conducting Instrument Approaches, to adequately resolve any conflict.

3.7 Conclusions

3.7.1 The proposed new procedures will significantly improve the operation of flights when weather conditions dictate that Runway 03 is in use and offer improved routing to the Airport and reduced fuel burn, whilst eliminating the requirement for visual manoeuvring at low level below cloud in repositioning from an approach to Runway 21.

4 ENVIRONMENTAL ASSESSMENT

4.1 General

4.1.1 The CAA guidance material contained within CAP 725 requires that the Sponsor undertakes an Environmental Assessment in order to assess the potential environmental impact attributable to the proposed change to the airspace arrangements. Whilst the CAP 725 specifies particular assessments defining traffic forecasts, effects of noise, change in the fuel burn/CO2, effect on local air quality and economic valuation of the environmental impact, not all of these categories can be adequately assessed for this proposal and this is explained further in this section.

4.2 Areas under the IAP Profiles

4.2.1 As explained in Section 2, there is already a variety of aircraft flying through the local area at 3000ft and below operating in accordance with the RotAR within Class G airspace. The effect of introducing the new IAP will be to bring some continuity to the routes flown towards Runway 03. As shown in Table 2-1, the number of IAP movements has generally been between 8-10% of total aircraft movements at Cranfield.

4.2.2 Runway selection was explained in paragraph 3.2.3 and at Cranfield Runway 21 is used for about 70% of the time. In Table 2-1, we provided total aircraft movements at Cranfield during the past 5 years and estimated the number of IAPs that would have made a Circling Approach to Runway 03 (based on the assumption that Runway 03 was in use for 30% of the time). Although there has been no requirement to record the number of Circling Approaches flown, the estimates provided in Table 2-1 are considered reasonable. With the potential usage calculated at circa 3% of the total aircraft movements per annum, we believe that a similar ratio of instrument approaches using the new IAP will be made to Runway 03 in the foreseeable future.

4.2.3 Design requirements applied to the new IAP were:

- Assure compliance with the design parameters contained in ICAO Doc 8168 PANS OPS Flight Procedures manual;
- Integrate readily into the current local airspace arrangements;

- Develop routes that minimised the overflight of conurbation and noise sensitive areas.

4.2.4 By and large the design requirements have been achieved with the proposed design set out in this Sponsor Consultation (see Appendix D). Whilst we are cognisant that the outbound leg of the new NDB/DME procedure overlies Milton Keynes (as shown in Figure 3-1), aircraft using the procedure will be descending from 3500ft to 2500ft amsl. Currently aircraft manoeuvring visually below cloud following an approach to Runway 21 could overfly parts of Milton Keynes as low as 800ft amsl in poor weather. Once the new IAPs are introduced, routine use of the visual manoeuvring procedure in poor weather conditions will be eliminated and aircraft positioning for an instrument approach to Runway 03 will be at a much higher altitude.

4.2.5 Excepting the requirement to overfly Milton Keynes (as described in the previous paragraph) few built-up areas will be overflown by aircraft flying the proposed IAP to Runway 03. In addition, no Areas of Outstanding Natural Beauty (AONB) or areas of Sites of Special Scientific Interest (SSSI) have been identified that might be affected by the introduction of the proposed IAPs.

4.3 Noise - General

4.3.1 The very nature of lining up on the extended centreline for Runway 03 will mean that potential exposure to aircraft noise on the approach will become more localised but not necessarily louder or more intrusive. There have been a number of studies into aircraft noise and the noise levels that emit from aircraft in flight and it is probably helpful to provide some comparative values and remove some of the false impressions that might exist about jet and turbo engines. Nonetheless, for those aircraft not making approaches to Cranfield noise will continue to be transitory and variable. It should be noted that there are no changes to the routes used currently by aircraft departing Cranfield and, therefore, these are not considered in this proposal.

4.3.2 Subsequent paragraphs attempt to describe the noise impact associated with the airspace change proposal and set out to clarify some misconceptions about noise emissions.

4.4 Noise - Comparisons

4.4.1 It is appreciated that noise annoyance and disturbance is not neighbourly and Cranfield Airport works hard to minimise the impact that might be caused by its operations. The UK CAA favours the Equivalent Noise Level metrics (LAeq) because scientific studies have shown there to be a relationship between LAeq values and the onset of annoyance. The World Health Organisation specifies the following noise levels:

- Onset of moderate annoyance – 50dB(A) Leq 16 hours
- Onset of serious annoyance – 55dB(A) Leq 16 hours

In basic terms these values mean that an average sound level of 50dB(A) will only start to cause annoyance for most people if it persists for 16 hours. Clearly louder noises would cause the onset of annoyance more quickly than this.

4.4.2 We believe that the onset of annoyance is highly unlikely to occur with the introduction of these proposed IAP because we neither expect the exposure of those households currently experiencing average noise levels in excess of the 50dB(A) to be changed, nor for additional households to experience average noise levels of 50dB(A) as a result of this proposal. The reasons for this are:

- The Procedural Control applied to IFR traffic allows for only a maximum of 6 aircraft movements per hour (i.e. 10 minutes between movements);
- The use of Runway 03 is generally determined by the prevailing wind and historically this would be for only 30% of the time;
- Aircraft would not be continuously making approaches during the published opening hours as there would be a need to permit aircraft to depart IFR also. Each departure would constitute a movement;
- Low noise levels generated by modern corporate aircraft on approach;
- The stabilised approach can be managed effectively by on-board flight management systems;
- Historical instrument approach data indicates that, on average, there would be only a few IAP movements per day. Maintaining the current

ATS, Cranfield Airport does not believe that this frequency would change appreciably after implementation.

4.4.3 There is a misconception that all jets are noisier than all turboprops which, in turn, are noisier than all piston aircraft. If estimated noise data from the US Federal Aviation Authority (source FAA Advisory Circular April 2002 AC No 36-3H) is evaluated it can be found that, for aircraft taking-off, the most popular training aircraft (Piper PA28 Cherokee) is twice as noisy as the quietest business jet (Cessna Citation Encore).

4.4.4 However, this consultation is about the establishment of approach procedures, a phase of flight when aircraft are not flown with the engine at full power. Table 4-1 below provides some comparative noise values derived from the same FAA Advisory Circular but for arriving aircraft which were monitored at 2000m (approximately 1.25miles) from the end of the runway when the aircraft would have been approximately 350ft or more above the ground. Clearly the noise levels experienced at greater distances from the end of the runway will be much less and maybe even inaudible if there is an ambient background noise. This is because the aircraft will be higher (as shown by the vertical profile in the charts shown in Appendix D) and because we will encourage the aircraft operators to use noise-reduction techniques for the approaches (e.g. CDA). Closer in towards touchdown on the runway, it is accepted that the aircraft will be closer to the ground and may be louder; however, this is no different to the position that aircraft find themselves in at the moment when positioning visually to final approach to land.

4.4.5 The data in the Table is provided to give the consultee an indication of the typical noise emitted by the subject aircraft flying the new IAP on Runway 03. By way of comparison against everyday usage of basic items, evidence suggests that a motor lawnmower emits a noise of 90 dB(A), a vacuum cleaner emits a noise of 75 dB(A) and if standing 5m from an HGV on the motorway it would emit a noise of approximately 95 dB(A).

4.4.6 The types of aircraft shown in Table 4-1 are typical of those using Cranfield. The most frequent visitors are Citation (in all variants), but the others shown are seen at least once or twice a week. Occasionally a modified HS46 Met Research aircraft operates from Cranfield which has a much quieter footprint than the business jets in the Table.

Aircraft Type		dB(A)
Piper Cherokee		61
Jetstream		74
Citation Jet (all variants)		78-80
Challenger		80
Falcon 900		81
Gulfstream IV & V		81
Learjet		81
Hawker 800		82

Table 4-1: Comparative Noise Levels on Approach – 2000m from Threshold

4.4.7 The noise levels shown in the third column of Table 4-1 are Lmax (peak noise levels) – see the definition of Lmax in the measurement section of Appendix A. It

can be noted that the dB(A) values across the range of business and executive jets are not dissimilar (between 78-82 dB(A)). Generally, given that the jet and turboprop aircraft will fly at an approach speed greater than 100 knots (indicated air speed) any transient noise emitted by the aircraft should pass in no more than 15-20 seconds.

4.4.8 As a result of introducing IAP to Runway 03 at Cranfield, it is evident that a few households will experience more overflights as aircraft are required to be lined up with the extended centreline of the runway up to 9NM from the threshold as opposed to the dispersed positioning that occurs with the current procedures. Notwithstanding, the type of aircraft that will routinely be seen at Cranfield are relatively quiet (when compared to the comparative items listed at the end of paragraph 4.4.4) and will be using flight techniques that minimise the chance of noise annoyance. The Sponsor believes that any noise impact will be minimal and localised but the major benefit to the air operation will be improved safety and efficiency.

4.5 Fuel Burn and CO_2

4.5.1 Typically, aircraft that will be using the IAP will arrive from one of the reporting points on the adjacent airways system (WCO and DTY). They will be released by NATS controllers, who provide air traffic services in the airways, at an agreed level flying towards Cranfield. Pilots of these aircraft will be encouraged to make direct arrivals using the GNSS procedure as depicted in Figure 3-4 and Appendix D. Those aircraft choosing to fly the conventional procedure (as described in paragraph 3.5.3) are likely to route to the beacon before flying the full procedure. That said, where weather conditions permit and providing that aircraft have sufficient distance to run to loose height (after release by NATS En-route) some aircraft will be able to fly Direct Approaches. It is anticipated that some IFR arrivals will come from other sectors within Class G airspace and will be similarly encouraged to make Direct Approaches.

4.5.2 Given that the exit points from the airways system are west and north-west from Cranfield, it is self-evident that aircraft making approaches to Runway 03 using the new IAP would not necessarily have to fly over and beyond the Airport to the east which is currently the case for traffic positioning for a Circling Approach to land on Runway 03 following an IAP on Runway 21. Similarly, aircraft arriving from these directions outside the airways system would benefit from the reduced

flight distance. The reduction is estimated to be approximately 25 track miles and therefore the fuel burn would be less. The potential number of aircraft that would benefit from this more efficient operation was cited in paragraph 4.2.2. Provided that NATS release the aircraft early enough, it will also be possible to promote the use of CDA which will further reduce the fuel used to complete an IAP and reduce CO_2 emissions.

4.5.3 It is not possible to provide an estimate of the CO_2 impact because values cannot be modelled with a satisfactory degree of accuracy for the IAP given the variables arising from: different aircraft types and operators; different exit points on the airway; the randomness of the approach paths that arises from the nature of the navigational aids available and the lack of prescribed tracks to be flown by aircraft within Class G airspace; the effect of flying in accordance with the RotAR within Class G airspace; the type of ATS provided. Notwithstanding, Cranfield Airport believes that the introduction of IAP to Runway 03 will provide a positive benefit overall.

4.6 Local Air Quality

4.6.1 Change Sponsors are only required to provide information on local air quality where the Airport operates within an AQMA. Local air quality regulations are principally concerned with gaseous material that can be harmful to human health including: particulates, ozone, benzene, carbon monoxide and oxides of nitrogen and sulphur. Cranfield does not lie in an AQMA and nor do the proposed approach paths for the IAP. Currently, the local authorities have not expressed any concern that the air quality in the vicinity of Cranfield is materially impacted by air operations into/out of the Airport. Consequently, no further assessment has been undertaken.

4.7 Conclusion

4.7.1 In developing the proposed new IAPs to Runway 03 at Cranfield Airport we have taken due cognisance of the need to sustain (and where possible improve) the safety and expedition of aircraft operations at the Airport and, at the same time take due cognisance of the impact of aircraft operations on the nearby communities. We consider that the procedures outlined in this Sponsor Consultation document provide an appropriate balance between the competing

needs of the aviation community and those communities on the ground in the vicinity of the Airport.

A. GLOSSARY OF TERMS

1. Organisational

Abbreviation	Meaning	Comment
ANSP	Air Navigation Service Provider	The organisation approved by the CAA to provide the air traffic navigation services at an Airport. In some cases the Airport Operator provides the air traffic services itself whilst at Cranfield Airport the Airport Operator contracts a specialist ANSP (Serco Limited) to provide the services.
CAA	Civil Aviation Authority	The specialist UK aviation Regulator established by government to oversee all aspects of aviation activity in the UK.
DAP	Directorate of Airspace Policy	The part of the CAA responsible for the airspace arrangements in the UK
ICAO	International Civil Aviation Organisation	An organisation established under the auspices of the United Nations through the Chicago Convention, charged with establishing Standards, Recommended Practices, Procedures for worldwide application.
NATS	NATS Ltd (Formerly National Air Traffic Services)	Previously part of the CAA, NATS is an Air Navigation Service Provider (ANSP) and was part privatised by Government in 2001. NATS provides civil en route air navigation services in the UK under license from the Government and provides air navigation services at a number of airports under contract to the airport operators.
LACC	London Area Control Centre	NATS En Route Area Control Centre located at Swanwick, Hants, providing civil en route ATS over the southern part of the UK airspace and Terminal ATC services for the London TMA Airports.
SRG	Safety Regulation Group	The part of the CAA which oversees all aspects of air safety including the operation of aircraft and air traffic services.

2. Documents

Abbreviation	Meaning	Comment
AIC	Aeronautical Information Circular	Notices relating to safety, navigation, technical, administrative or legal matters

AIRAC	Aeronautical Information Regulation and Control	A system which ensures worldwide advanced notification, based on common effective dates, of circumstances that require significant changes to operating practices. (The AIRAC System is linked to the amendment of AIPs on a worldwide basis.)
Annex	Annexe	ICAO documents (Annexes to the Chicago Convention) which detail the Standards and Recommended Practices (SARPS) to be applied by States worldwide. e.g. Annex 2 Rules of the Air Annex 6 Operation of Aircraft Annex 11 Air Traffic Services Annex 15 Aeronautical Information
CAP	CAA Publication	The UK CAA publishes Regulatory, Guidance and Information material in the form of CAPs.
CAP 724	The Airspace Charter	A document published by the CAA authorities, responsibilities and principles by which the CAA DAP, as the airspace approval and regulatory authority conducts the planning of airspace and related arrangements in the UK.
CAP 725	CAA Guidance on the Application of the Airspace Change Process	A document published by the DAP which details the procedure by which a proposal to modify airspace dimensions, classification or usage in the UK can be put forward to DAP for approval. The process to be followed by sponsors of airspace change enables the CAA to meet its statutory duties established under the Transport Act 2000.
MATS Part 1	Manual of Air Traffic Services Part 1	The UK document published by the CAA (CAP 493) which contains instructions and procedures applicable to UK air traffic services at civil air traffic control units, and represents the UK interpretation and application of ICAO SARPs and PANS relevant to air traffic services.
MATS Part 2	Manual of Air Traffic Services Part 2	The document which contains the local instructions for each air traffic control unit and provides information which amplifies and interprets, at a local level, the instructions in MATS Part 1. It also details local separation standards to be applied where these differ from the national criteria because of specific local circumstances. The MATS Part 2 is subject to approval by the CAA as part of the Regulatory process.

PANS	Procedures for Air Navigation	ICAO documents which are the next level down from SARPS detailing procedures recommended for worldwide application. They specify in greater detail than the SARPS the actual procedures to be applied. e.g. PANS-OPS: Aircraft Operations PANS-ATM: Air Traffic Management
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations (ICAO Doc 8168)	Volume 2. Construction of Visual and Instrument Flight Procedures. A document published by the ICAO which specifies the criteria which are to be used on a world-wide basis for the design of Visual and Instrument Flight Procedures
UK AIP	UK Aeronautical Information Package	The State publication published by the CAA (CAP 32) to ICAO requirements detailing all of the aeronautical information and procedures applicable to civil aircraft operations in the UK. The UK AIP is a notifying document, which means that procedures notified within it have legal authority. Amendment of the UK AIP is in accordance with the AIRAC system.

3. Measurement

Abbreviation	Meaning	Comment
	Units of Measurement	Aviation uses a mixture of imperial and metric measurements. Whilst runway lengths are measured in metres, distances for navigation are measured in nautical miles (NM). One NM is a distance of 6017.12ft, equivalent to 1.8520km. The standard unit for vertical measurement is feet (Ft).
aal	Above Aerodrome Level	The vertical displacement of an aircraft above aerodrome level is known as **Height**. The aircraft altimeter is set to the barometric pressure at the aerodrome (known as QFE).
amsl	Above Mean Sea Level	The standard level reference for aircraft operations and airspace design below the Transition Altitude. The height of an aircraft measured above mean sea level is known as **Altitude** (ALT). The aircraft altimeter is set to the barometric pressure at the aerodrome, adjusted to take account of the aerodrome elevation (known as QNH).

dB(A)	A-weighted decibel	Decibel (a unit of “loudness” of a sound), “A-weighted” (which matches the frequency response of the human ear).
FL	Flight Level	The height of an aircraft above a standard barometric pressure reference of 1013.25 Hectopascals (equivalent to Millibars (Mb) used in the UK), and is the standard level reference for aircraft operations above the Transition Altitude.
Lmax	Peak noise	As an aircraft approaches a noise monitor, the sound of the aircraft begins to rise above the threshold level. The closer the aircraft gets, the louder it is until the aircraft is at its closest point directly overhead. As the aircraft passes, the noise level decreases until the sound settles below the threshold level. Such a history of a flyover is plotted and the highest noise level reached during the flyover is called the “Maximum Noise Level”, or LMax

4. Airspace

Abbreviation	Meaning	Description
	Classification of Airspace	The ICAO system of classifying airspace by letter indicating the level of Air Traffic Service provided in the airspace and the meteorological criteria for VFR flight. Classes A to E are Controlled Airspace; Classes F and G are uncontrolled airspace. Class A airspace requires the mandatory operation of all flights according to the Instrument Flight Rules, Classes B, C, D and E controlled airspace permit VFR operations with differing levels of ATM compliance and application of separation by ATC.
	Class G Airspace	Uncontrolled airspace within which both IFR and VFR flights are permitted to operate without reference to ATC. Air Traffic Services Outside Controlled Airspace (ATSOCAS) may be provided, on request, by suitably equipped ATSUs.
ATS	Air Traffic Services	A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service). (ICAO)
ATC	Air Traffic Control	A service provided for the purpose of preventing collisions between aircraft, and, on the manoeuvring area, between aircraft and obstructions, and expediting and maintaining an orderly flow of air traffic.

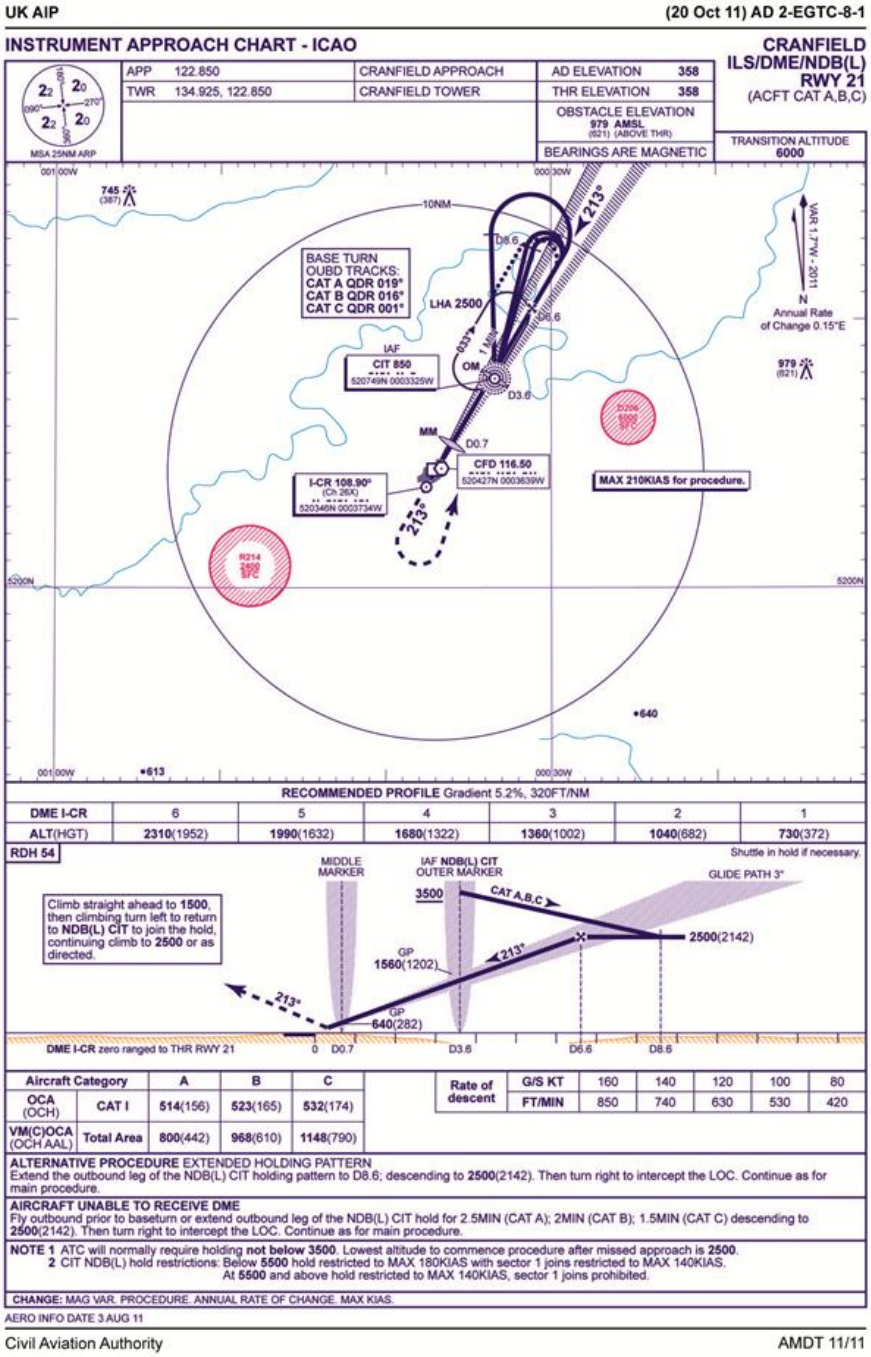
ATM	Air Transport Movement	Landings or take offs by aircraft engaged on the transport of passengers, cargo or mail on commercial terms. All scheduled movements, including those operated empty, loaded charter and air taxi movements are included.
ATZ	Aerodrome Traffic Zone	Airspace of defined dimensions established around an aerodrome for the protection of aerodrome traffic.
CDA	Continuous Decent Approach	A noise abatement technique for arriving aircraft in which the pilot, when given descent clearance below transition altitude by ATC, will descend at the rate best suited to the achievement of continuous descent, whilst meeting the ATC speed control requirements, the objective being to join the glide path at the appropriate height for the distance without recourse to level flight.
CTA	Control Area	A controlled airspace extending upwards from a specified limit above the surface to a specified upper limit.
CTR	Control Zone	A controlled airspace extending upwards from the surface to a specified upper limit.
IAP	Instrument Approach Procedure	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.
IFR	Instrument Flight Rules	Rules 32 to 37 of the Rules of the Air Regulations (RotAR) 2008.
IMC	Instrument Meteorological Conditions	Meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, less than the minima specified for Visual Meteorological Conditions.
TMA	Terminal Control Area	A Control Area normally established at the confluence of a number of ATS Routes in the vicinity of one or more major aerodromes.
VFR	Visual Flight Rules	Rules 25 to 30 of the RotAR 2008
VMC	Visual Meteorological Conditions	Meteorological conditions expressed in terms of visibility, distance from cloud and ceiling, equal to or better than specified minima. In the UK the VMC minima for VFR operations in various classifications of airspace are laid down in Rule 27 of the RotAR 2008.

5. Infrastructure

Abbreviation	Meaning	Description
DME	Distance Measuring Equipment	A navigational facility which provides information to an aircraft indicating its distance from the facility. DME may be installed in conjunction with an en route, terminal or approach navigational facility.
GNSS	Global Navigation Satellite System	A navigation infrastructure using satellite based navigation data.
GPS	Global Positioning System	A GNSS provided by the US Department of Defence and available for public use.
ILS	Instrument Landing System	A precision instrument approach navigation aid which provides lateral and vertical track guidance to aircraft along the final approach track and distance information.
NDB	Non Directional Beacon	An MF en route and/or terminal and approach navigational facility from which the pilot can determine the bearing of the facility with reference to his own position.
RNAV	Area Navigation	A method of navigation which permits aircraft operation on any desired flight path within the coverage of station referenced navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

B. AIP CHARTS - Current

B.1 Current charts for the ILS/DME and NDB/DME IAP published in the UK AIP.



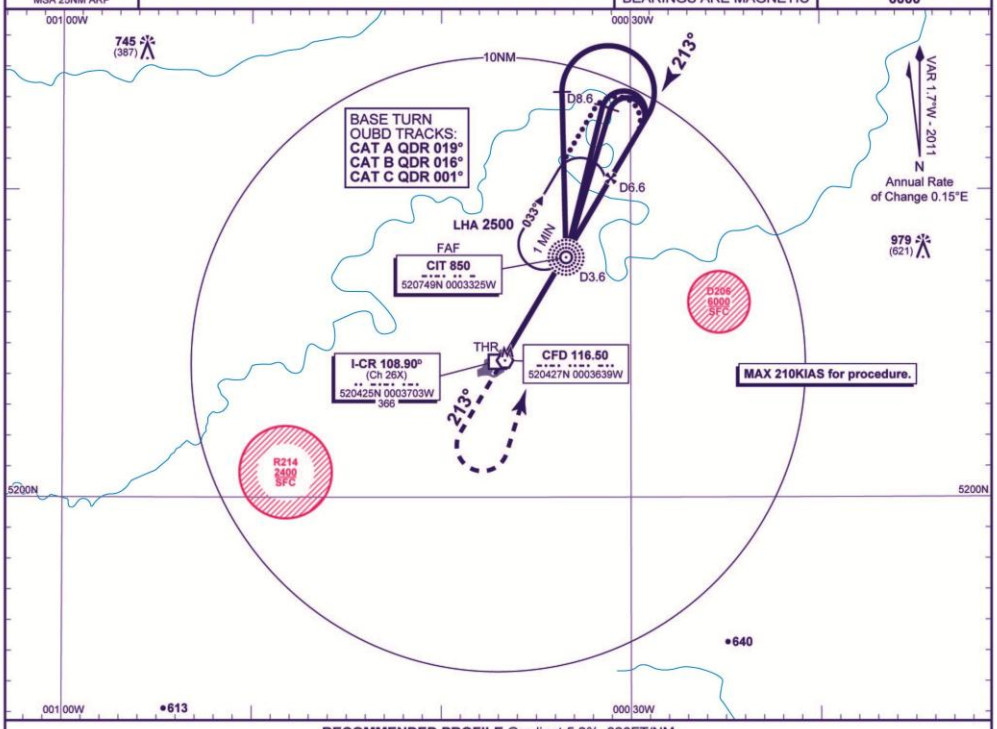
AD 2-EGTC-8-4 (20 Oct 11) **UK AIP**

INSTRUMENT APPROACH CHART - ICAO

CRANFIELD
NDB(L)/DME
RWY 21
(ACFT CAT A,B,C)

APP 122.850	CRANFIELD APPROACH	AD ELEVATION	358
TWR 134.925, 122.850	CRANFIELD TOWER	THR ELEVATION	358
		OBSTACLE ELEVATION 979 AMSL (621) (ABOVE THR)	
		BEARINGS ARE MAGNETIC	TRANSITION ALTITUDE 6000

MSA 25NM ARP



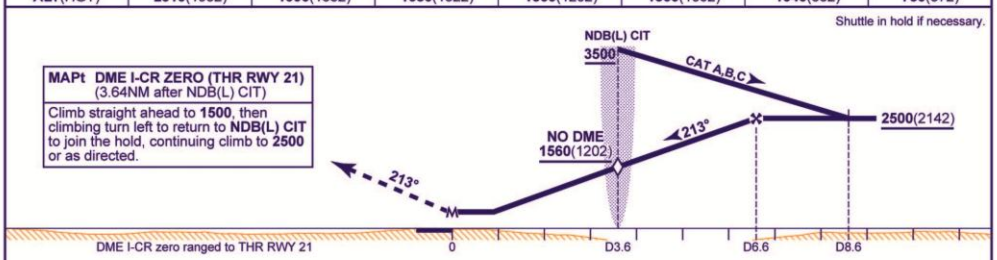
RECOMMENDED PROFILE Gradient 5.2%, 320FT/NM

DME I-CR	6	5	4	3.6 (SDF)	3	2	1
ALT(HGT)	**2310**(1952)	**1990**(1632)	**1680**(1322)	**1560**(1202)	**1360**(1002)	**1040**(682)	**730**(372)

Shuttle in hold if necessary.

MAPt DME I-CR ZERO (THR RWY 21)
(3.64NM after NDB(L) CIT)

Climb straight ahead to **1500**, then climbing turn left to return to **NDB(L) CIT** to join the hold, continuing climb to **2500** or as directed.



Aircraft Category		A	B	C
OCA (OCH)	Procedure	**690**(332)	**690**(332)	**690**(332)
VM(C)OCA (OCH AAL)	Total Area	**800**(442)	**968**(610)	**1148**(790)

Rate of descent						
	G/S KT	160	140	120	100	80
	FT/MIN	860	750	640	540	430
NDB(L) CIT to MAPT	MIN:SEC	1:25	1:35	1:50	2:12	2:46

ALTERNATIVE PROCEDURE EXTENDED HOLDING PATTERN
Extend the outbound leg of the NDB(L) CIT holding pattern to D8.6; descending to **2500**(2142). then turn right to intercept the FAT. Continue as for main procedure.

AIRCRAFT UNABLE TO RECEIVE DME
Fly outbound prior to Baseturn or extended outbound leg of the NDB(L) CIT hold for 2.5MIN (CAT A); 2MIN (CAT B); 1.5MIN (CAT C) descending to **2500**(2142). Then turn right to intercept the FAT. When established inbound descend not below **1560**(1202) at the SDF (NDB(L) CIT), then to MDH.

NOTE 1 ATC will normally require holding **not below 3500**. Lowest altitude to commence procedure after missed approach is **2500**.
2 CIT NDB(L) hold restrictions: Below **5500** hold restricted to MAX 180KIAS with sector 1 joins restricted to MAX 140KIAS.
At **5500** and above hold restricted to MAX 140KIAS, sector 1 joins prohibited.

CHANGE: MAG VAR. PROCEDURE. DME ADDED. MINIMA. NEW ALTERNATIVE AND NO-DME PROCEDURE TEXT. MAX KIAS.

AERO INFO DATE 10 AUG 11

AMDT AIRAC 11/11 Civil Aviation Authority

C. LIST OF CONSULTEES

1. Aviation Consultees (Airport)

Air Traffic Control Ops and Eng (SERCO)
AKA Aviation (Fuel)
Azure Flying Club
Billins Air Services
Bonus Engineering
Bonus Flying School
Cabair
Cranfield Aerospace
Cranfield Flying School
Cranfield Handling
Cranfield Helicopters
Cranfield University Estates and Site Services Department,
Cranfield University Security
Direct Flight
Eagle Air Flight Training
Helimech
IAE Engineering
National Flight Laboratory

2. Aviation Consultees (other local airspace users)

Aston Abbots
Bicester Airfield (CFI)
Holmbeck Farm
Hulcote Farm Aerodrome
London Gliding Club (Dunstable Downs)
London Luton Airport (Hd of Airport Operations)
Salford Helicopter site

3. Aviation Consultees (National Organisations) (NATMAC)

Airport Operators Association
AOPA UK
Aviation Environment Federation
BA
BAA
BAE Systems
BALPA
BATA
BBAC
BBGA
BGA
BHPA
BMAA
BMFA
BPA
British Helicopter Association
GAPAN

GASCo
GATCO
HCGB
Heavy Airlines Representative
LAA
Light Airlines Representative
Low Fares Airlines
NATS (NERL)
NATS (NSL)
PPL/IR Europe
UAVS Association
UKAB
UKFSC

4. Aviation Consultees (Military)

Military Aviation Authority (MAA)
Ministry of Defence

5. Non-Aviation Consultees (County, District and Borough Councils)

Aylesbury Vale District Council
Bedford Borough Council
Borough Council of Wellingborough
Central Bedfordshire County Council
Chiltern District Council
East Northamptonshire Council
Huntingdon District Council
Luton Borough Council
Milton Keynes Council
Northampton Borough Council
South Buckinghamshire District Council
South Cambridgeshire District Council
South Northamptonshire District Council

6. Non-Aviation Consultees (Parish Councils)

Aspley Guise Parish Council
Aspley Heath Parish Council
Astwood & Hardmead Parish Council
Bletchley & Fenny Stratford Town Council
Bow Brickhill Parish Council
Brinklow Parish Council
Brogborough Parish Council
Bromham Parish Council
Broughton & Milton Keynes Parish Council
Campbell Park Parish Council
Clapham Parish Council
Cranfield Parish Council
Dunton Parish Council
Fleet Marston Parish Council (Amalgamated to Waddesdon)
Great Brickhill Parish Council
Granborough Parish Council

Hoggeston Parish Council
Hulcote & Salford Parish Council
Kempston Rural Parish Council
Kents Hill and Monkston Parish Council
Lidlington Parish Council
Little Brickhill Parish Council
Little Horwood Parish Council
Loughton Parish Council
Marston Moretaine Parish Council
Moulsoe Parish Council
Mursley Parish Council
Newton Longville Parish Council
North Crawley Parish Council
Oakley Parish Council
Oving Parish Council
Pitchcott Parish Council
Shenley Brook End Parish Council
Shenley Church End Parish Council
Simpson Parish Council
Stoke Hammond Parish Council
Swanbourne Parish Council
Turvey Parish Council
Upper Winchendon Parish Council
Waddesdon Parish Council
Walton Parish Council
Wavendon Parish Council
West Bletchley Council
Westcott Parish Council
Winslow Town Council
Woburn Sands Town Council
Wootton Parish Council
Woughton Parish Council

7. Non-Aviation Consultees (Other Organisations)

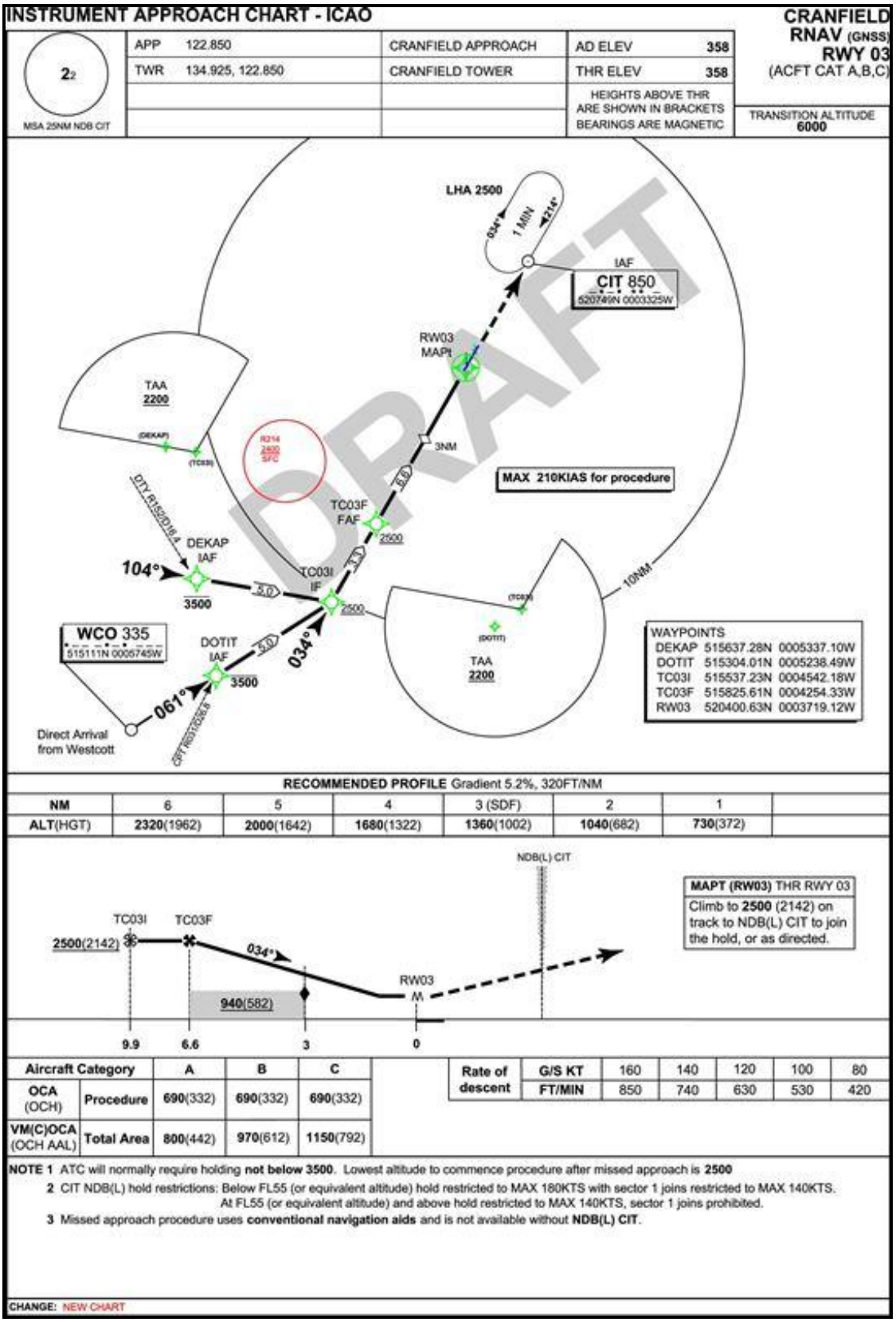
Natural England
National Trust
CPRE

8. Non-Aviation Consultees (Members of Parliament)

A Burt	North East Bedfordshire
N Dorries	Mid Bedfordshire
R Fuller	Bedford
K Hopkins	Luton North
M Lancaster	Milton Keynes North
A Selous	South West Bedfordshire
G Shuker	Luton South
I Stewart	Milton Keynes South

D. AIP CHARTS – New Proposals

D.1 The Draft RNAV-GNSS chart is depicted below.



D.2 The Draft NDB-DME chart is depicted below.