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ACP-2019-18

Enabling RPAS and RAF Aerobatic Team Operations Out of RAF Waddington

Stage 4A – UPDATE DESIGN

**OPTIONS APPRAISAL (PHASE III – FINAL)
ISSUE 1.0**

Roles

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Introduction

1. Scope

1.1 This document forms part of Stage 4A of the Airspace Change Proposal ACP-2019-18, which was commenced in 2019 to enable the operation of a large Remotely Piloted Air System (RPAS), Protector RG Mk1, from its main operating base when it comes into service at Royal Air Force (RAF) Waddington from the early-2020s. This requirement remains in place. The Change Sponsor for this ACP is the Ministry of Defence (MOD). An additional requirement emerged in 2020 for the RAF Aerobatic Team (RAFAT) to be able to access airspace over RAF Waddington to conduct flying display activity from 2023. The MOD felt that the best way to manage this new requirement was to combine both the Protector and RAFAT requirements within one airspace change. The Civil Aviation Authority (CAA) and the MOD agreed a means by which to do so and both requirements have been incorporated since Stage 2 for this ACP.

1.2 The MOD, and specifically Air Capability, is the Change Sponsor for this proposal. The proposal seeks to secure airspace for:

- the integration of Protector RG Mk1 into UK airspace in the early 2020s;
- the RAFAT to conduct training over RAF Waddington.

1.3 The aim of this document is to provide evidence to the CAA that the Change Sponsor has adhered to the process laid out in CAP 1616 for Stage 4. It builds upon the work undertaken during the Full Options Appraisal in Stage 3 by considering the requirement for any refinements or changes as a result of the Stage 3 formal consultation with stakeholders. Final analysis of the proposed airspace design option will be completed prior to taking it forward for the final submission.

1.4 **Stage 3 Full Options Appraisal.** The Full Options Appraisal at Stage 3 evaluated just one airspace design against the Do-Nothing (baseline) option. As per CAP 1616, the Change Sponsor had previously stated that this was the MOD's preferred airspace design option.

1.5 **Stage 4 Final Options Appraisal.** The Final Options Appraisal is an evolution of the Full Options Appraisal. At Stage 3 the Change Sponsor proposed just one airspace design option for consultation. Following analysis of the feedback received during the 12-week Consultation which ran Sep – Nov 2022, the Change Sponsor found that no change to the proposed airspace design was required. However, the options appraisal will be repeated within this document. The airspace design consists of one design from each of the following two categories:

- One airspace design for the airspace in the vicinity of RAF Waddington Surface up to FL105 (known as the **low airspace design** (Stage 2 Option 1));
- One airspace design for the airspace in the vicinity of RAF Waddington FL105 - FL195 (known as the **medium airspace design** (refined Stage 2 Option 8)).

1.6 The single design comprises two volumes of airspace, the lateral boundaries of which overlap and which are vertically joined. These combined volumes of airspace provide appropriate segregated airspace for the Protector and RAFAT activities.

1.7 This document uses the most up-to-date and credible data available. For instance all charts have been produced using up-to-date CAA digital aeronautical 1:250 000 or 1:500 000 charts.

Section 1- Context

2. Supplementary Evidence

2.1 After completing the Initial Options Appraisal the Change Sponsor identified additional information to be collected or firmed up to inform the next stage of the Options Appraisal. The information is as follows:

- The Information from the manufacturer regarding noise output of the TPE331-10 Turboprop engine to inform its noise impact. If required this can be used to provide a comparison against some of the current assets flying from RAF Waddington and those that have recently been retired from service;
- Information from the manufacturer regarding emissions associated with the Honeywell TPE331-10 Turboprop engine to inform its effect on air quality and greenhouse gas impact. If required this can be used to provide a comparison against some of the current assets flying from RAF Waddington and those that have recently been retired from service;
- Firm up Protector's estimated flying tempo in order to provide a clearer estimate of the flying hours and hours of segregated airspace activation; If appropriate this may be used to assist in estimating the consequential impacts of rerouting of other airspace users;
- By reference to RAFAT, provide clarity on predicted usage of segregated airspace by RAFAT in order to assess impact on access to the airspace by GA;
- By reference to stakeholders and/or interrogative software refine estimate on impact on fuel burn if GA do not / cannot take advantage of a crossing service (e.g. DACS) to achieve a direct routing in the low and medium level airspace design options.

2.3 The following information has been produced:

2.4 Honeywell TPE331-10 Turboprop Engine Noise Output

- a. Whilst the MOD is not mandated to provide specific information on the direct consequences of military flying on noise impacts, the Change Sponsor undertook to provide a statement regarding noise output of the engine as a comparison against some of the current assets flying from RAF Waddington and those that have recently been retired from service.
- b. Protector is powered by a single Honeywell TPE331-10 turboprop engine, the type of engine often used in small civil aircraft e.g. Bae Jetstream 41. Such civil aircraft and many other military aircraft routinely fly in the locality of the proposed new airspace, and many people will be familiar with the noise that results from this type of aerial activity. However, unlike these aircraft, Protector will not persistently occupy the proposed airspace for long periods of time, rather it will use the airspace primarily as a means of transit to and from its operating and training areas and will seldom (if ever) fly repetitive circuit patterns below 3000 ft AGL.
- c. In the vicinity of Waddington, when operating below 2000 ft, the noise may be audible on the ground, as is the case for all other aircraft operating at the airfield. However, in the case of Protector, the resulting peak noise level is expected to be lower than the majority of military aircraft currently based at and recently retired from the airfield. Comparison with a Noise Exposure Study carried out at RAF Brize Norton in 2014,

summary published on the Gov.uk website. Using multi-engine in-Service aircraft, such as C-130J, C-17A, A400 and A330, types similar in size and engine power to Waddington aircraft, the noise impact expected from Protector has been determined as significantly lower. The detachment of Protector's "prototype" SkyGuardian to RAF Waddington during the summer of 2021, resulted in no adverse comments about noise and individuals operating on the aerodrome remarked on how quiet the aircraft was in comparison to other station-based aircraft when taxiing and departing / recovering to the runway.

2.5 Honeywell TPE331-10 Turboprop Engine Emissions

- a. For any internal combustion engine exhaust emissions are directly proportional to fuel burn. It is recognised that aircraft and other vehicles produce CO₂ and other emissions which may have a detrimental impact on the environment and local air quality.
- b. Whilst United Nations International Civil Aviation Organisation identify that emissions are only a concern from ground level to 1000ft, the United Kingdom Sustainable Aviation advisory board along with many international partners **utilise** 3000 ft above ground level (AGL) as a defining level above which emissions have little or no effect on local air quality. The area in which the proposed new airspace lies is already overflowed by both civil and military aircraft and since much of Protector's sorties will be spent away from the aerodrome, it is estimated that less than 6% of its total flying time will be spent below 3000 ft AAL, mostly associated with take-off and landing; minimal emissions would be generated below 3000 ft AGL. That said an analysis of the pollutants produced by the Honeywell engine was carried out and compared against United States Environmental Protection Agency report (EPA420-F-08-02 – available online) which states that a Heavy-Duty Gasoline-Fuelled Vehicle (similar to a large SUV/pick-up truck which is considered to have a severity of Minor with respect to emissions. In all bar one pollutant (Fine Particulate Matter) the Honeywell engine was deemed to produce approximately 40% less emissions overall in comparison to the Heavy-Duty Gasoline-Fuelled Vehicle.

2.6 Protector's Flying Tempo

It has not been possible to add any further granularity to the projected flying tempo for Protector when it comes into service. As stated in the Stage 2 engagement material, excepting operation commitments, the Change Sponsor anticipates that during the first 6 months of Protector's service in the RAF, the flying tempo will be restricted to one air vehicle at a time during core flying hours Monday – Friday. This is likely to occur up to 3 times per week. It is difficult to predict when the flying tempo will significantly increase, but potentially within the first 24 months of service, there may be up to 2 air vehicles in the air simultaneously. Some night-flying is expected.

2.7 Predicted usage of low airspace design by RAFAT

- a. The future of RAF Scampton is still unsure. However, the Change Sponsor is able to offer a small update on the likely use of RAF Waddington by RAFAT for flying display activity. At this time, the RAF is investigating multiple alternatives to EG R313 for RAFAT training. The ability to use EG R313 while RAF Scampton remains in Crown ownership and following sale is still pending, with confirmation unlikely prior to formal submission of the airspace change proposal on 20 Mar 23. As no single alternative to EG R313 is currently apparent, the RAF is considering numerous sites for RAFAT training vignettes. RAF Waddington, as the future home of RAFAT, is an obvious alternate training location but is unlikely to support the full training requirement.

- b. The following was disseminated with the Stage 2 engagement.

“The Defence Infrastructure Organisation has presented the real estate at RAF Scampton for sale without any caveats for the enduring RAFAT activity. Therefore, from April 2023 RAFAT may not be able to make use of EG R313. At this time the MOD can offer 2 scenarios for consideration for its activity at RAF Waddington:

- *Should EG R313 remain available for RAFAT display activity, the requirement for activity at RAF Waddington could be 4 – 5 lunchtime sessions per week during the winter for corporate visits (late Sep – early Apr).*
- *If EG R313 were not available for RAFAT display activity, the requirement for activity at RAF Waddington could be 3 - 6 display practices per day (late Sep – early Apr). In this scenario EG R313 would almost certainly be permanently withdrawn.*

Display practices will normally take place Monday – Friday during daylight hours. There is likely to be a requirement for occasional weekend use during summer (mid May - late Sept) for In Season Practice (ISP). This is an activity that is required if RAFAT approaches approximately one week having not displayed and is designed to keep the display sharp. It is probable that with a reduction in airshows that normally keep RAFAT current, this weekend requirement may increase, although it currently tends to normally occur Monday - Friday. Occurrence is potentially not more than twice per month (Monday - Sunday).”

- c. RAFAT has provided an updated statement (dated 24 Feb 23) on current airspace requirements and planning. It is at Annex A.

2.8 Estimated impact on General Aviation’s fuel-burn

- a. The MOD has endeavoured to refine an estimate on impact on fuel burn if GA do not / cannot take advantage of a crossing service (e.g. DACS) to achieve a direct routing in the low and medium level airspace design options. This was carried out by reference to stakeholder feedback received in Stage 2. The details can be found in the environmental assessment in Annex B.

3. Environmental Assessment

3.1 The Change Sponsor is the MOD and is, therefore, only responsible for assessing the consequential environmental impact on civil air traffic. For this reason the Change Sponsor has not considered the environmental impact of the Protector and RAFAT activities in conjunction with this ACP.

3.2 CAP 1616 provides guidance to Change Sponsors on how to carry out an environmental assessment.

3.3 A Level M1 ACP has the potential to alter traffic patterns below 7000 ft and Sponsors must demonstrate a clear consideration of noise impacts. This is likely to necessitate noise modelling and the use of WebTAG and noise metrics. For a Level M1 ACP the following environmental elements must be assessed and included in the consultation material:

- Noise
- CO₂ emissions
- Local air quality (for any option that includes changes below 1000 ft)
- Tranquillity
- Biodiversity

3.4 CAP 1616 requires such assessments to include a number of specific metrics in order to derive quantitative output. The MOD has considered the effects on noise, local air quality, tranquillity and biodiversity for the low airspace design and has provided its assessment at Annex B. The MOD has also considered the potential effect on CO2 emissions and fuel burn for the low and medium airspace designs, which are also included at Annex B.

4. **Safety assessment**

4.1 A safety assessment was presented with the Stage 2 Options Appraisal (Phase I) Initial and underwent minor amendment at Stage 3A. This has been reassessed during Stage 4 in light of comments and feedback from consultation. It is assessed that the information obtained during consultation supports the underlying assumptions made during Stage 2 and does not change the safety assessment outcomes on the use of segregated airspace in the form of a danger area. It is useful to describe why specifically segregated airspace is being requested for the Protector and RAFAT activities at RAF Waddington.

4.2 **Protector.** UK military aviation is regulated by the Military Aviation Authority (MAA). Accordingly the Protector programme is subject to the MAA Regulatory Publications (MRP). Of particular relevance to the operation of Protector in UK airspace is MAA Regulatory Article (RA) 2320 – MAA regulation for operation of military RPAS. The RA states the criteria for beyond visual line of sight (BVLOS) RPAS operation such that within UK airspace, BVLOS operations should:

- a. *Either* employ an appropriately approved DAA capability to enable compliance with the Rules of the Air appropriate to the class of airspace,
- b. *or* be flown using a Layered Safety Approach that specifically requires flight in segregated airspace.

4.3 When Protector comes into service it will be fitted with a limited DAA capability only, which is not likely to meet the requirements to fly in all classes of airspace (and specifically not in class G). The working assumption is that Protector will be able to fly within classes A and C airspace. The MOD is following a full type certification process, under the jurisdiction of the Military Aviation Authority (MAA), which is expected to provide assurance that Protector is airworthy and suitably equipped to fly in UK airspace Classes A and C, under Instrument Flight Rules (IFR) as Operational Air Traffic (OAT) only. In addition, the MOD Protector programme is progressing an airspace integration safety assessment (AISA) that will provide argument and evidence that Protector will be safe to operate and operated safely in UK airspace. The AISA will be scrutinised by the MAA, but responsibility for its acceptance rests with the military risk owner: the Aviation Duty Holder. Since RAF Waddington is located within class G airspace, some form of airspace segregation is required for its transit through class G airspace in order to be able to achieve onward transit using classes A and C airspace.

4.4 Establishment of a danger area will permit Protector to perform its planned activities in a safe environment, maintain regulatory compliance, and provide protection to other airspace users of any associated and identified hazardous activities.

4.5 **RAFAT.** Having some form of protected airspace is essential for the safety of RAFAT pilots and other airspace users. When display flying, the Team generally fly at 360kts, from 100ft above ground level (AGL) up to approximately 8000 ft AGL if the weather allows a vertical routine. This makes reaction times slow, and it can be cumbersome to reactively manoeuvre the formation. As all pilots take references from the Team leader, there are very few pairs of eyes looking out for other traffic and the Team relies on a radar service for early warning of intruders.

4.6 The MOD's preference is to implement the segregated airspace in the form of danger areas. This also ties in with the feedback received from the majority of stakeholders engaged with in Stage 2A of this ACP. If danger areas are implemented the following will be in place to ensure safety is managed:

- a. Any airspace will not be permanently active; it will only be activated for the periods when RAFAT or Protector flying is due to take place. Procedures will be in place to ensure that the airspace is activated and notified as and when required. This will involve appropriate NOTAM action being taken at least 24 hrs in advance. To ensure minimum disruption to other airspace users a DACS will be available within all implemented airspace. This means that, even if the airspace has been notified as being active, it may be possible for both civil and military aircraft to transit through it subject to Protector and RAFAT flying under a clearance from Waddington ATC.
- b. RAF Waddington ATC will be manned at all times during RAFAT and Protector operations. Confirmation on the current status of the airspace will be available from other appropriate military ATC units, such as 78 Sqn (Swanwick Military), when Waddington ATC is closed (see also para 5d below).
- c. Protector will remain within its segregated airspace at all times until it has reached either class A or C for further transit or has landed. Emergency procedures are being drawn up and several panels / workshops are in train to ensure all appropriate aviation stakeholders are involved / informed.
- d. Protector will not routinely loiter in its segregated airspace. The low and medium airspace designs are intended for egress from and ingress to RAF Waddington only. This means that, whilst the airspace may be active, the air vehicle may not be operating within it. In addition it should be noted that the presence of Protector within its segregated airspace does not preclude its use by other aircraft. The airspace will not be required to remain sterile; ATC co-ordination procedures are being drawn up to enable simultaneous use by other airspace users. ATC services will be available throughout the activation of the segregated airspace as appropriate to provide access to other airspace users subject to Protector or RAFAT activities. This will:
 - o Minimise the requirement for re-routing of civil or military airspace users
 - o Enable co-ordinated access to the segregated airspace by aircraft transiting the local area, aircraft airways joining, general handling aircraft and those wishing to utilise the Litchfield and Gamston Radar Corridors.
- e. Access to the low level airspace design option is likely to be impacted during RAFAT flying display events/training at RAF Waddington, resulting in other airspace users requiring to hold outside the airspace until a clearance to route through can be given or by taking a re-route.
- f. Re-routing of aircraft due to the segregated airspace may impact safety. The MOD will make a crossing service available to other airspace users, which will help to mitigate the potential increased risk incurred by re-routing. Safety may be impacted through the need to re-route as follows:
 - o Re-route through unfamiliar areas
 - o Funnelling as a result of need to re-route

- Increased risk of loss of safe separation / mid-air collision (LoSS/MAC) due to re-routing aircraft creating bottlenecks
- Increased controller workload due to funnelling and dealing with airspace crossing requests (e.g. DACS)

4.7 CAP 1616 requires the Change Sponsor to consider the effect that MOD activity may have on other airspace users. The Change Sponsor will need to keep General Aviation fully informed of the changes to airspace and, the availability of a crossing service (DACs etc). This will maximise awareness, thereby reducing the likelihood of infringement of active segregated airspace. Media engagement, local airspace group briefings and other informing activities will be put in place prior to first use of the airspace.

Section 2

5. Operating Principles

5.1 The following operating principles will be implemented for the combined low and medium airspace designs:

- a. **Type of airspace.** The Change Sponsor intends to implement the required segregation in the form of a danger area, which will provide the most efficient and tactical use of airspace. The MOD will activate the airspace structures only as and when necessary. In other words, only when activity by either RAFAT or Protector is planned.
- b. **Activation Periods.** The proposed airspace will not be permanently active; it will only be activated when RAFAT or Protector flying is due to take place. Proven procedures will be adopted to ensure that the airspace is activated and notified as and when required. This will involve appropriate NOTAM action being taken at least 24 hrs in advance. The proposed airspace will be managed by the Military Airspace Management Cell (MAMC). The danger area airspace would be kept active for the duration of the RAFAT and/or Protector sorties. In the latter case this is required in order to facilitate early recovery or emergency situations.
- c. **Access to Airspace.** To ensure minimum disruption to other airspace users a Danger Area Crossing Service (DACS) will be offered within any implemented airspace. This means that, even if the airspace has been notified as being active, it may be possible for both civil and military aircraft to transit through it under a clearance from Waddington ATC.
- d. **Air Traffic Control.** RAF Waddington ATC will be manned at all times during RAFAT and Protector operations. Confirmation on the current status of the airspace will be available from other appropriate military ATC units when Waddington ATC is closed. The Change Sponsor investigated the provision of an ATIS-like service during the SkyGuardian deployment in 2021 and for the TDA which is currently in place at RAF Syerston. It again considered its use for this ACP. For technical, regulatory and ATC workload reasons, the provision of a useful ATIS to broadcast real-time status of the proposed airspace is not considered practicable. The aspiration to provide airspace users with a means to determine whether a piece of airspace is hot or cold is unmanageable from a resource/workload point of view and, therefore, has flight safety implications (RAF Waddington ATC has conducted a safety assessment into the amount of information that can safely and accurately be uploaded for transmission via ATIS). However, Waddington Radar will provide a DAAIS and DACS on the Waddington LARS frequency of 119.5MHz. In the event of a last minute cancellation of the airspace and Waddington Radar is not available, London Information will provide a DAAIS on 124.6MHz.

6. Options Appraisal

6.1 Stage 4A requires the Options Appraisal (Phase II) Full that was carried out in Stage 3 to be developed further for each shortlisted option. As set out in the environmental assessment in Annex B, quantitative assessments are agreed to be disproportionate to the potential impact of the proposed airspace and have been agreed to be out of scope. However, the Change Sponsor has continued to develop the Options Appraisal though Stage 4A using qualitative assessment only.

6.2 The low and medium designs have been assessed against the Do-Nothing option that is described below

6.3 The Do-Nothing option

6.4 RAF Waddington sits entirely within class G airspace, which ordinarily does not provide adequate protection or segregation respectively for RAFAT and Protector at IOC. In broad terms civil and military regulations specify that without an appropriately approved DAA capability, Protector must be flown using a Layered Safety Approach that specifically requires flight in segregated airspace. Protector will not have an appropriately approved DAA at IOC. Protector will be based at RAF Waddington. Additionally, having protected airspace is deemed essential for the safety of the RAFAT pilots and other airspace users. "Doing nothing" would effectively deny access to the airspace directly above RAF Waddington for Protector and RAFAT. Comment from ISTAR Force Headquarters regarding a Do-Nothing scenario is as follows: *'The Waddington ACP for MQ-9B Protector is an essential element to fulfil the UK live training requirement for the new platform. Failure, to achieve approval for the proposed ACP, would have a direct impact upon this training requirement of our front line crews and have a subsequent effect upon operational delivery and output for the MOD. There is currently no alternative ACP option for live flying, therefore, we would be unable to generate any UK Protector capability.'* The scenario is similar for RAFAT in that if the opportunity to train overhead RAF Scampton in EG R313 is withdrawn and the proposed airspace over RAF Waddington was not available, the options to provide training for a key element of UK 'soft power' (and promoting UK interests worldwide) would be extremely limited.

6.5 In such cases CAP 1616 requires the Change Sponsor to assess each option against a baseline in which the "do-nothing" scenario is used to describe the existing situation against which the changes that would result from the implementation of each proposed design option can be assessed. A map of the local area is at Figure 1. The baseline is as follows.

6.6 RAF Waddington in Lincolnshire is the hub of UK Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) and the main operating base for airborne intelligence aircraft and systems. Its current flying assets include:

- a. RC-135W Rivet Joint (51 & 54 Sqns) - a dedicated electronic surveillance aircraft
- b. Shadow R1 (14 & 54 Sqns) which contributes to the comprehensive intelligence gathering of the RAF's ISTAR Force.
- c. RAFAT
- d. Waddington Flying Club - a civilian flying club which operates PA28 and Tecnam P2008JC for flying training throughout the week and weekends.



Figure 1– Local Area Airspace

6.7 RAF Waddington has an Aerodrome Traffic Zone (ATZ) and a Military Aerodrome traffic Zone (MATZ) and is abutted by RAF Scampton to the north and RAF Cranwell to the south. At the current time RAFAT uses EG R313 throughout the year for aerobatic display practices¹ although the future use of EG R313 is uncertain. RAF Cranwell is the home No 3 & No 6 Flying Training School (FTS) operating the Embraer Phenom 100 (Multi Engine Pilot Training (MEPT)) aircraft and the 120TP Prefect aircraft respectively. It also has a thriving gliding club. RAF Coningsby is located to the east of RAF Waddington and is home to two frontline, combat-ready squadrons and is the training station for Typhoon pilots. It is also a RAF Quick Reaction Alert (QRA) station, protecting UK airspace. To the south west of RAF Waddington is RAF Syerston, home to 2 FTS, the RAF Central Gliding School and operates the Viking T Mk 1 glider and Robin DR400 aerotow aircraft.

6.8 The Lincolnshire CTA is located above and slightly north of RAF Waddington; the base level of Class A airspace overlaps Waddington’s MATZ at FL125, lowering to FL85 to the west and rising to FL155 to the east. To the south of the CTA, the airspace is Class G up to FL195; Class C extends from FL195 upwards south of the CTA. However, during specified hours² much of the airspace over Lincolnshire is activated as a Temporary Reserved Area (TRA). Although the background classification between FL195 and FL245 is Class C, to avoid operational restrictions, military aircraft may operate

¹ RAFAT has relocated to RAF Waddington following the closure of RAF Scampton (this was further explained in this ACP submission documentation).

² Mon-Fri 0830 to 1700 UTC Winter; Mon-Fri 0730 to 1700 UTC Summer; Excluding English Public Holidays.
TRA may be activated at other times by NOTAM.

autonomously or in receipt of an air traffic service. MOD and USAFE aircraft are the predominant users but use of the TRA is not restricted to military users.

6.9 The local area is also populated by numerous civil airfields and airstrips supporting some significant leisure flying (general aviation, gliding, paragliding and parachute activity). Busy airfields at Temple Bruer and Wickenby are particularly adjacent to the proposed airspace and a very healthy level of general aviation and sporting/leisure flying activity takes place within the local area.

6.10 Over the past 5 years RAF Waddington's annual airfield movements have seen a reduction from 12431 in 2017 to around 9000 in each of the following 4 years. In 2021 the E3D was retired from service (although it is continuing to operate at RAF Waddington in an out-of-service training role); the Sentinel was retired in Feb 2022. Following this, early indications indicate a potential reduction in airfield movements for 2022 in the region of 20% compared with figures for 2018 – 2021.

6.11 About 18% of total movements last year were made up by practice diversions (PDs), the majority by aircraft from RAF Cranwell.

6.12 The aerodrome operating hours are notified as follows, although it should be noted that RAF Waddington currently operates a flexible flying window and times may differ from them at short notice:

- 0800 – 2359 Mon – Thu
- 0800 – 1800 Fri

6.13 Military aviation activity in current airspace construct.

6.14 At Stage 2 of the ACP the MOD had presented 6 airspace design options up to 9500 Ft AMSL directly over RAF Waddington to provide segregation for the Protector and RAFAT activities at the lower level. This was reduced to just one option up to FL105. A further 2 airspace designs were presented from FL 105 – FL195 which were conjoined to the lower airspace designs and would allow Protector further access classes A and C airspace. The following paragraph endeavours to broadly describe the current military aviation activity in both pieces of airspace. Whilst military aviation is not wholly predictable, a typical day at RAF Waddington might be as follows. Rivet Joint aircraft are likely to depart early to their respective operating areas and recover later often carrying out an instrument approach to land. They do not routinely spend large amounts of time in the local area. Shadow may have up to 4 sorties per day, each typically departing to the northeast of Waddington for general handling activity before returning to base, crew change and repeat. Shadow may conduct a couple of radar circuits or visual circuits before landing. Waddington hosts numerous PDs throughout the day, mainly by RAF Cranwell aircraft and averaging 4 – 9 PDs per day. Waddington's Flying Club operates PA28 and Tecnam P2008JC which conduct sorties throughout the week and weekend, predominantly over the aerodrome and in the local area. The airspace directly overhead Waddington is used by aircraft from Cranwell and Coningsby to route outbound to the northwest and to position for instrument approaches to their respective aerodromes. These are all co-ordinated through routine ATC means.

6.15 The airspace design options presented to segregate Protector activity from FL105 – FL195 (airspace design Options 7 and 8 MEDIUM) encompass airspace that is used by Tutor and Prefect aircraft from RAF Cranwell up to 10,000ft. Cranwell's Phenom aircraft operate in the same airspace FL80 – 120 and preferably above FL100 to separate from Tutor and Prefect traffic. Phenom operate 12 – 16 sorties per day with night flying on up to 3 nights per week. Phenom training syllabus includes airways joins at Trent and the aircraft make regular use of the Gamston and Lichfield Radar Corridors.

6.16 **Civilian aviation activity in current airspace construct:**

6.17 Whilst the MATZ is not a mandatory avoid for civil pilots, the majority of civil pilots call Waddington ATC when flying in proximity to RAF Waddington and when requiring to transit within 5 nm of RAF Waddington. On an average day, ATC will receive around 15 requests for MATZ and overhead crossings from GA aircraft (both leisure and sporting). This may peak to the high 20s on the busiest flying days, but is estimated to be less than 30 on any given day. Gliding activity is generally limited to the west and south of Waddington and largely 2000 – 5000 ft. Most requests for MATZ crossings are approved with minimum restrictions to the requested route and altitude. An occasional route alteration may be proposed by ATC to sequence crossers with Waddington traffic patterns either by lateral or vertical means. Outside the ATZ pilots are not duty-bound to accept the re-route and do not always do so, choosing to follow their stated route and keep a good lookout. The airspace FL105 – FL195 is used by gliders on a relatively infrequent basis and by the occasional aircraft leaving the national route structure to position for the Midlands airports. The British Parachute School aircraft at Langar make regular use of the area over the Vale of Belvoir up to FL150 as depicted in green on Figure 2 below.



Figure 2 – Langar Skydive Operating Area

6.18 Final Combined Low and Medium Airspace Design Options

6.19 Figure 3 depicts the combined low and medium airspace designs in plan and cross-section view.

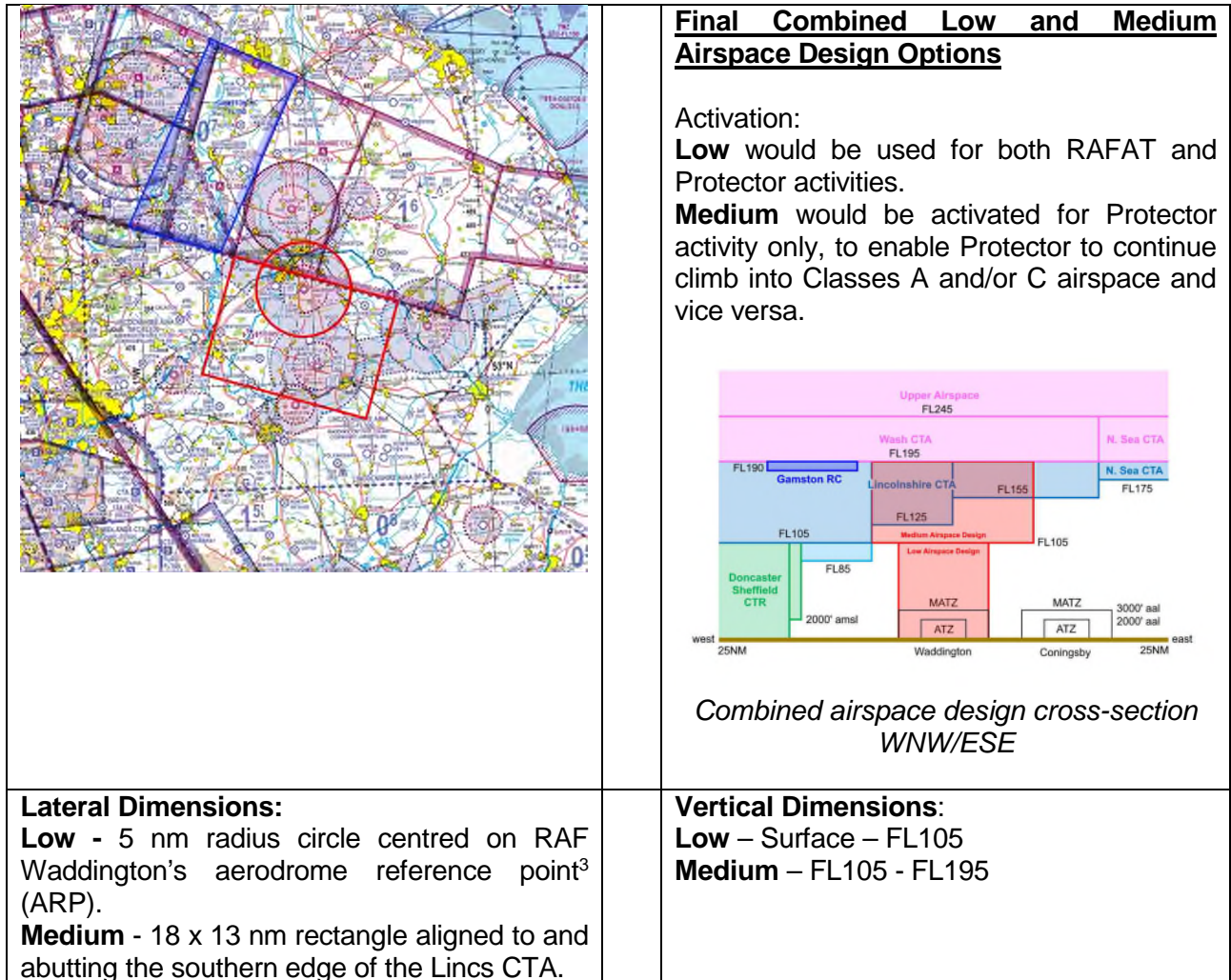


Figure 3- Combined Low and Medium airspace designs

6.20 Table 3 details the appraisal of the low airspace design and the “Do-Nothing” baseline option against the high-level objectives and assessment criteria laid out in CAP 1616, Appendix E, Table E2.

6.21 Over and above the requirement in CAP 1616 Appendix E, Table E2, an additional row has been added to the table outlining safety considerations in brief.

³ RAF Waddington’s airfield reference point is the midpoint of RW02/20 (530958N 0003126W)

Table 1 - Summary of options appraisal for the low airspace design

Group	Impact	Low airspace design	Do-Nothing
Communities	Noise impact on health and quality of life	<p>Civil aircraft: The mechanism for crossing the airspace associated with this option (DACS) would be very similar to that of crossing the MATZ. There is expected to be a very low (if any) increase in noise likely since the low airspace design has the same lateral footprint as the extant MATZ at RAF Waddington. The majority of civil pilots already call to cross the MATZ and they are required to avoid the ATZ. Vertically the low airspace design extends above the MATZ to FL105. Waddington ATC reports few civil aircraft transit within 5 nm from Waddington between 3000 ft AAL and FL105 and that it is rare that they would cross without calling on the radio. It is thought, therefore, that the majority of aircraft will continue to call to cross any segregated airspace implemented. The majority of aircraft will opt for a crossing service (e.g. DACS), which will be granted when possible. Occasional rerouting is envisaged if activity within the segregated airspace precludes a clearance. The potential for rerouting is likely to be increased during RAFAT flying display periods, but this should be balanced against the ability for aircraft to access the airspace over Scampton for transit, since Scampton and Waddington should not be simultaneously active for RAFAT. The majority of stakeholders who provided feedback in Stage 2 carry radios and speak to ATC so rerouting could be minimised. It is considered that any consequential impact on noise</p>	<p>Neither RAFAT nor Protector would be able to fly at RAF Waddington, so no increased noise impact from any new activity. No additional noise impact on health and quality of life since civil and military pilots would carry on as they do now – ATZ and MATZ would still be in existence.</p> <p>There is the likelihood that some rerouting already occurs below 3000 ft AAL under the Do-Nothing option which could already impact health and quality of life.</p>

Table 1 - Summary of options appraisal for the low airspace design

Group	Impact	Low airspace design	Do-Nothing
		<p>and therefore on health and quality of life from this option is very low over and above the impact of the Do-Nothing option.</p> <p>Protector is powered by a Honeywell TPE331-10 Turboprop engine; estimated no increase in noise impact compared with Do-Nothing option (see supplementary evidence).</p> <p>RAFAT activity will be largely switching display practice locations between RAF Scampton and RAF Waddington. No additional noise effect anticipated as flying tempo will not change, but noise will impact different communities.</p>	
Communities	Air Quality	<p>Civil aircraft: No impact envisaged in overall air quality through establishment of segregated airspace – see environmental assessment in Annex B.</p> <p>Similarly no reduction in air quality envisaged by military activity (see supplementary evidence)</p>	Change Sponsor estimates negligible impact on local air quality because of aviation activities.
Wider society	Greenhouse gas impact	<p>Whilst there is no additional flying anticipated from civil GA community in terms of numbers of aircraft, there may be a small increase in greenhouse gas if GA do not / cannot take advantage of a crossing service (e.g. DACS) to achieve a direct routing.</p> <p>Estimated Protector flying tempo is up to 3 flights per week initially, although requirement is evolving.</p> <p>Change Sponsor was unable to firm up the estimate (see supplementary evidence)</p> <p>No additional flying anticipated from RAFAT since the flying</p>	<p>Neither RAFAT nor Protector would be able to fly at RAF Waddington, so there would be no increase in greenhouse gas from any new activity.</p> <p>No increase in greenhouse gas from existing aviation, since civil and military pilots would carry on as they do now – ATZ and</p>

<i>Table 1 - Summary of options appraisal for the low airspace design</i>			
Group	Impact	Low airspace design	Do-Nothing
		will just switch from one location to the other. Minimal increase anticipated in Greenhouse gas impact from Protector activity, although overall reduction in impact is likely in local area due to relocation/retirement of several flying assets from RAF Waddington (see supplementary evidence).	MATZ would still be in existence. There is the likelihood that some rerouting already occurs below 3000 ft AAL under the Do-Nothing option which would already impact greenhouse gas levels.
Wider society	Capacity / resilience	Not applicable	There would be no change from present since neither activities would be able to operate at RAF Waddington
General Aviation	Access	There may be a small impact on ease of access to the low airspace design by GA. Estimated initial Protector flying tempo will require activation of segregated airspace up to 3 days per week. Protector will spend minimal time (approximately 10 minutes during departure or recovery phase) in the low airspace design. Access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Access to the low airspace design is likely to be impacted during RAFAT display practices. RAFAT is currently in the process of determining which of its display / training activities can be safely conducted at Waddington, which in turn will inform the estimate of usage, and thereby assist with impact on access to the airspace by GA. Change Sponsor was unable to firm up	There would be no change from present since neither activities would be able to operate at RAF Waddington. There is the likelihood that there are some minor access issues already occur below 3000 ft AAL under the Do-Nothing option.

Table 1 - Summary of options appraisal for the low airspace design			
Group	Impact	Low airspace design	Do-Nothing
		the estimate (see supplementary evidence). Worst case scenario 6 x 30-minute daily training slots (Monday-Friday) (see Annex A)	
General Aviation / commercial airlines	Economic impact from increased effective capacity	Not applicable	Not applicable
General Aviation / commercial airlines	Fuel burn	There may be a small increase in fuel burn if GA do not / cannot take advantage of a crossing service (e.g. DACS) to achieve a direct routing. Attempt to provide quantitative estimate by Change Sponsor (see environmental assessment).	Neither RAFAT nor Protector would be able to fly at RAF Waddington, so there would be no increase in fuel burn from any new activity. No increase in fuel burn from existing aviation, since civil and military pilots would carry on as they do now – ATZ and MATZ would still be in existence. There is the likelihood that some rerouting already occurs below 3000 ft AAL under the Do-Nothing option which would already impact fuel burn.
Commercial airlines	Training costs	Not applicable	Not applicable
Commercial airlines	Other costs	Not applicable	Not applicable

<i>Table 1 - Summary of options appraisal for the low airspace design</i>			
Group	Impact	Low airspace design	Do-Nothing
Airport /ANSP	Infrastructure costs	Not applicable	Not applicable
Airport /ANSP	Operational costs	Not applicable	Not applicable
Airport /ANSP	Deployment costs	Not applicable	Not applicable
Safety Considerations (not exhaustive list)		<ul style="list-style-type: none"> • Pilots being unaware of new airspace • Re-route through unfamiliar areas • Funnelling as a result of need to re-route • Increased risk of loss of safe separation / mid-air collision (LoSS/MAC) due to re-routing aircraft creating bottlenecks • Increased controller workload due to funnelling, DACS requests • Proximity of RAF Cranwell visual and radar circuit traffic 	There would be no additional safety considerations since neither activities would be able to operate at RAF Waddington

6.22 Table 2 details the appraisal of the medium airspace design and the “do-nothing” option against the high-level objectives and assessment criteria laid out in CAP 1616, Appendix E, Table E2.

<i>Table 2 - Summary of options appraisal for the medium airspace design</i>			
Group	Impact	Medium airspace design	Do-Nothing
Communities	Noise impact on health and quality of life	No noise impact anticipated as Protector only operating in segregated airspace for short duration and above FL105.	Protector would not be able to operate at RAF Waddington, so no increased noise impact from any new activity. No additional noise impact on health and quality of life since

<i>Table 2 - Summary of options appraisal for the medium airspace design</i>			
Group	Impact	Medium airspace design	Do-Nothing
			civil and military pilots would carry on as they do now
Communities	Air Quality	No reduction in air quality anticipated as Protector only operating in segregated airspace above FL105.	Protector would not be able to operate at RAF Waddington, so no reduction in air quality from any new activity. No additional reduction likely since civil and military pilots would carry on as they do now
Wider society	Greenhouse gas impact	Feedback from stakeholders and Waddington ATC suggest very few civil airspace users access the segregated airspace associate with the medium airspace design, so the consequential impact of this option is likely to be negligible in terms of greenhouse gases (see environmental assessment). Estimated Protector flying tempo is up to 3 flights per week initially, although requirement is evolving. Change Sponsor was unable to firm up the estimate (see supplementary evidence) Minimal increase anticipated in Greenhouse gas impact from Protector activity, although overall reduction in impact is likely in local area due to relocation/retirement of several flying assets from RAF Waddington (see supplementary evidence).	Protector would not be able to operate at RAF Waddington, so no change in greenhouse gas anticipated from any new activity. No additional reduction likely since civil and military pilots would carry on as they do now
Wider society	Capacity / resilience	Not applicable	There would be no change from present since the airspace

<i>Table 2 - Summary of options appraisal for the medium airspace design</i>			
Group	Impact	Medium airspace design	Do-Nothing
			above FL105 would remain unaltered.
General Aviation	Access	Estimated Protector flying tempo will require activation of segregated airspace up to 3 days per week and will spend very little time in the medium airspace design. Whilst feedback from stakeholders revealed that few operated within the medium airspace design, access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Avoided disruption to Skydive Langar by refinement of this option.	There would be no change from present since the airspace above FL105 would remain unaltered.
MOD/RAF Aviation	Access	May be some impact on access for MOD/RAF aviation conducting training sorties up to FL120 and accessing Gamston Corridor at FL190/ joining controlled airspace, although the Change Sponsor has made some refinement of medium airspace design to mitigate this. Impact should be minimal unless there is some reason why military pilots are unable to obtain DACS / crossing clearance.	There would be no change from present since the airspace above FL105 would remain unaltered.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Not applicable	Not applicable
General Aviation / commercial airlines	Fuel burn	Negligible impact on fuel burn since few GA operate above FL105 (see environmental assessment).	No impact.
Commercial airlines	Training costs	Not applicable	Not applicable

<i>Table 2 - Summary of options appraisal for the medium airspace design</i>			
Group	Impact	Medium airspace design	Do-Nothing
Commercial airlines	Other costs	Not applicable	Not applicable
Airport /ANSP	Infrastructure costs	Not applicable	Not applicable
Airport /ANSP	Operational costs	Not applicable	Not applicable
Airport /ANSP	Deployment costs	Not applicable	Not applicable
Safety Considerations (not exhaustive list)		<ul style="list-style-type: none"> • Pilots being unaware of new airspace • Re-route through unfamiliar airspace (proximity to controlled airspace) • Funnelling as a result of need to re-route • Increased risk of loss of safe separation / mid-air collision (LoSS/MAC) due to re-routing aircraft creating bottlenecks • Increased controller workload due to funnelling, DACS requests • CAA Safety Buffer Policy 	There would be no additional safety considerations since neither activities would be able to operate at RAF Waddington

Section 3

7. Conclusions and Next Steps

8. Summary and preferred option

8.1 The Change Sponsor has just one preferred airspace design, which is the combined low and medium design option; it consists of one design which is comprised as follows:

- a. One airspace structure for the airspace in the vicinity of RAF Waddington below FL105 (known as the **low airspace design**);
- b. One airspace structure for the airspace in the vicinity of RAF Waddington FL105 - FL195 (known as the **medium airspace design**).

8.2 At Stage 3 the Change Sponsor proposed and the CAA agreed that, since the impact on other airspace users and the environment is considered to be low, further attempts to provide quantified or monetised analysis would be disproportionate and provide little if any additional clarity for stakeholders. A high level assessment of costs and benefits was provided for all design options at Stage 2B, including the Do-Nothing option. As above there would seem little benefit in repeating this analysis at this stage particularly since the nature of the surrounding airspace at RAF Waddington makes it impossible to reasonably predict current and impacted traffic patterns.

8.3 The Do-Nothing (baseline) option does not satisfy the Design Principles agreed in Stage 1 and does not provide any segregation or protection respectively for the operation of Protector BVLOS and RAFAT at RAF Waddington.

8.4 **Ongoing Work.** Further work has been undertaken within the MOD and with NATS with regards to the CAA safety buffer policy; mitigations to obtain dispensation from it have been identified and will be presented to the CAA with the 4B submission. Further work has been completed with regard to the CAA safety buffer policy to determine whether the medium airspace design could be further reduced. It was ascertained that no further reduction was possible.

8.5 The following CAP 1616 timeline is anticipated:

Event as per CAP 1616	Planned Date
Stage 4 – Update and Submit	20 Mar 23
Stage 5 - Decide	31 Jul 23
Stage 6 - Implement	30 Nov 23

Annex A

RAFAT AIRSPACE REQUIREMENTS, INTENT AND PLANS – dated 24 Feb 23

Background.

The Royal Air Force Aerobatic Team, officially known as RAFAT but more commonly referred to as The Red Arrows, perform high energy, highly dynamic low-level aerobatic displays in formations of up to 9 aircraft. They display in front of UK audiences during the summer and regularly deploy overseas as a key element of UK 'soft power' to promote UK interests worldwide. They are a British national asset, not just an RAF capability.

RAFAT Annual Training Programme.

RAFAT training in the UK has hitherto taken place from late September to late March using protected airspace over the Team's home-base at RAF Scampton. This airspace volume has a 5nm radius, extends from the surface up to 9300ft AGL and is designated as EG R313. While training in the UK, there are normally 6 x 30-minute daily training slots (Monday-Friday), to allow 3 x slots for the main section and 3 x slots for the Synchro Pair. In early March the Team will put the different formation elements together and start their 9-ship training, with a requirement for only 3 x 30-minute daily training slots. The Team then depart the UK to perfect their display routine abroad, typically in eastern Europe where they take advantage of better weather. Following the Team's return to the UK in late May having achieved Public Display Authority, the UK Display Season typically provides the currency the Team need to keep their routine honed and thus practice display flying is infrequent during the summer months. Occasional in-season practices are however required for currency.

Airspace.

Having protected airspace is deemed essential for the safety of the Team pilots and other airspace users to mitigate Loss of Safe Separation and Mid-Air Collision. When display flying, the Team generally fly at 360kts, from 100ft AGL up to approximately 8000ft AGL when the weather allows a vertical display routine. These flight profiles make reaction times slow, and it can be cumbersome to manoeuvre the formation reactively in response to a traffic sighting or alert. As all pilots take their formation references from the Team Leader, there are very few pairs of eyes looking out for other traffic and the Team rely on a radar service for early warning of intruders.

Future of RAF Scampton.

Following the RAF's decision to sell RAF Scampton, the Team relocated to RAF Waddington in late 2022. There is considerable uncertainty about what will happen to RAF Scampton after it is sold by the MoD. Whatever the land area is used for in the future (and who owns it) will determine whether EG R313 remains useable by RAFAT for their display training. Therefore the RAF has had to examine alternative locations and airspace volumes for RAFAT practice flying.

The RAF's intent has been, and remains, to use EG R313 for as long as it is available and safe to do so. If and when it becomes clear that the airspace is not viable, alternative locations will have to be used by RAFAT to train and practice their display; one of the RAF's highest-profile operational outputs. This planning can be broken down into 3 broad options depending on what happens to RAF Scampton. These are outlined below:

Option 1. Continue to use EG R313 as the primary display practice location, but complete occasional 30-minute practice slots over RAF Waddington using the ACP-2019-018 airspace volume. This would allow the Team's supervisory chain to have regular opportunities to watch the training, which is harder to achieve when the Team practice entirely at a different location. It would

also allow the Team's important charitable and corporate engagement programme to continue without the complications of having to transport people to/from Scampton. This option would also allow the local community to gain exposure to the Team's display activity and help RAFAT embed into RAF Waddington. This option will only see infrequent RAFAT flying over RAF Waddington utilising protected airspace proposed under this ACP, probably no more than 3-4 sorties per week during the peak corporate visit programme which normally runs from January to March. Such activity will be limited to the minimum required and will be almost completely restricted to the winter training months before the Team deploy abroad in late March/early April each year. Such limited training will also provide vital information about the suitability of the site, should a different option be required.

Option 2. This option caters for a scenario where EG R313 becomes non-viable for RAFAT use in the near future. This is a realistic possibility. Should this occur, the Team will be forced to enact a contingency plan that has been developed to ensure they can continue training. This would see far greater use of RAF Waddington and the ACP-2019-018 airspace for Team training. RAFAT are currently assessing the suitability of RAF Waddington as a practice display location, including live use of the site using RA(T)s to gather data. Collected evidence and table-top assessment will lead to the production of a detailed risk assessment for sign-off by the Aviation Duty Holder and the Head of Establishment. If approved in full, RAFAT will be able to use RAF Waddington for all their training requirements.

Option 3.

RAFAT also currently have a TDA in place at RAF Syerston for evaluation as a Synchro Pair training site if RAF Waddington is not deemed suitable for all elements of their flying. In this event, the intent would be to use the TDA evidence to support a full ACP to establish airspace for the Synchro Pair to use RAF Syerston for approximately 3 months every winter, with main formation flying taking place at RAF Waddington. If the risk assessment concludes that RAF Waddington could be used for the Synchro Pair as well, then RAF Syerston will not be considered further.

Downselecting Options and Making Compensating Reductions.

The closure of RAF Scampton has required a reassessment of where RAFAT should train in the UK over the winter period. There are a great number of factors to consider for each location; ultimately the operating risk associated with each must be minimised as much as possible while still enabling maintenance of the operational output. The current interest in 3 different sites might give the impression of the RAF 'hedging its bets'; this is not the case. Because of the high-technical merit flying that RAFAT perform, very careful consideration must be given to each site in advance of it being chosen, including live-flying trials which themselves require protected airspace volumes. The continued uncertainty surrounding Scampton and EG R313 is also making future planning more challenging.

Once the best option is chosen (or events dictate which option we have to use), the RAF fully understand that airspace volumes which are no longer required may have to be discarded and removed. The RAF also understands the operational impact to other airspace users of simultaneous activation of large volumes of segregated airspace in close proximity; we would put protocols or mechanisms in place to reduce or avoid such simultaneous activations.

Conclusion.

Uncertainty surrounding the future of the Scampton site post-sale is making planning future RAFAT training operations challenging. What is clear is that RAFAT will require a large volume of protected airspace to mitigate the MAC risk while they train and in turn to preserve a safe operating environment for all airspace users. The RAF is assessing a number of sites for their suitability as RAFAT training locations should EG R313 become non-viable. Once an option is selected, the RAF understands that airspace volumes not planned for use will need to be removed in order to minimise impact on other airspace users.

RAFAT DISPLAY SAFETY ASSURANCE

Background. RAFAT display activity is governed by both military and civil regulations: Military Aviation Authority Regulatory Article 2335 (MAA RA 2335) and Civil Air Authority Civilian Air Publication 403 (CAP403). Whilst the applicability of the regulations can differ for some display activity (RA 2335 over MOD Property, CAP 403 over Non-MOD Property) the most restrictive of the regulations will be applied.

Assurance Activity. Display activity, including practice displays, will only be conducted within the bounds of an (MAA or CAA as required) approved display area and remains subject to the same rigorous levels of supervision, coordination, and control, of a full public display. The approval of a display area and profile considers the proximity of congested areas and the risk to 3rd parties. In addition, each practice is subject to authorisation and supervision by the Flying Display Supervisor who holds an accredited Flying Display Director qualification. All display activity overhead RAF Waddington will be monitored by Air Traffic Control and the Flying Display Supervisor who maintains direct radio communications to the participating aircraft. All displays (including practice) are video recorded to support rigorous debrief. The first and highest priority of any debrief is always any safety elements.

Conclusion. RAFAT display flying, as with all military flying, is risk managed to levels that are 'As Low as Reasonably Practicable' and 'Tolerable'. Any activity that does not meet these criteria shall be ceased immediately until appropriate mitigation can be applied to assure continued safe conduct.

Annex B

Environmental Assessment

- B1. In considering what degree of environmental assessment is required, the MOD has obtained from ATC at RAF Waddington two assessments of the potential consequential effect of the low airspace design on civil traffic. The first is a qualitative assessment provided by air traffic personnel regarding the estimated frequency of civil air traffic passing within 5 nm overhead RAF Waddington. On an average day, Waddington ATC will receive around 15 requests for MATZ and overhead crossings from GA aircraft (both leisure and sporting) operating below 7000 ft AAL, with the majority requesting crossings below 4000 ft AAL. This may peak to the high 20s on the busiest flying days, but is estimated to be less than 30 on any given day.
- B2. The second assessment was provided in the form of supporting quantitative evidence. Waddington ATC keep MATX-crossing statistics and provided the Change Sponsor with a monthly breakdown of MATZ crossing requests for the year of 2019, prior to the coronavirus pandemic. The figures apply to requests for Monday to Friday only and no further granularity is available. The figures provided are available in the Stage 2B submission (Annex B) which can be found on the CAA ACP portal. The figures support the qualitative estimate as in the busiest month of Aug 2019 the total number of MATZ crossing requests was 76 under the current airspace construct. Dividing this by 4 gives a weekly total of 19. Assuming there were 2 or 3 busy flying days in any given week, the figures suggest an average of 6 – 10 MATZ crossing requests per day. This would align with the qualitative estimate of 15 – 20 crossings of the Waddington MATZ and overhead, since a fair proportion of those requesting an overhead routing might plan to fly above the MATZ to maximise success of getting a crossing approval.
- B3. Once any segregated airspace is activated, it is thought that most of these aircraft will continue to request and obtain a DACS to cross the low airspace design, with only a small percentage of them requiring a reroute due to activity within the segregated airspace. This qualitative assessment has been used in the following environmental impact assessments.

Noise

- B4. In the MOD's Stage 2 submission a rationale was proposed that since the ACP was expected to impact less than 30 civil aircraft per day, the MOD should not be required to conduct any Leq contours or WebTAG noise modelling. To do so was assessed at disproportionate to the impact created; the CAA accepted this rationale. CAP 1616 also proposes that change sponsors should consider Nx contours and overflight as environmental metrics for noise measurement. Whilst the MOD had not specifically mentioned these in the Stage 2 submission, the Change Sponsor similarly proposes that taking into account the predicted low numbers of civil aircraft being impacted by the proposed airspace, there would be minimal change to the areas overflowed and, therefore, has scoped out the requirement to use Nx contours and overflight in its environmental assessment.
- B5. The Change Sponsor also considered whether it would be possible or indeed useful to provide operational diagrams of civil traffic patterns to compare likely changes between the baseline scenario and the situation after the implementation of any proposed airspace over Waddington, In this case the MOD proposes that since the surrounding airspace is Class G, where the majority of the civil air traffic is GA and engaged predominantly in leisure or

- B6. sporting activity, it would be difficult to predict any definite traffic patterns created by any new segregated airspace. CAP 1616A suggests that operational diagrams may be useful when it is difficult or impossible to measure aircraft noise accurately and reliably. The MOD has scoped out the requirement to conduct noise modelling as to do so was assessed as disproportionate to the impact created. For the entirety of the activation period of any segregated airspace civil air traffic will be able to take advantage of a DACS and it is thought that for the majority of the activation period such requests will be successful, with minimal requirements to reroute. The MOD feels, therefore, that it would be difficult to produce accurate and useful operational diagrams for future traffic patterns and that there would be minimal benefit in doing so. The Change Sponsor has, therefore, scoped out the use of operational diagrams.
- B7. In seeking some qualitative assessment of the impact of the proposed airspace on noise the Change Sponsor has assessed that the proposed change will not result in an increase in the number of aircraft operating in the local area, nor will the aircraft types be altered. Therefore, the same amount and type of noise is likely to impact the local population as is currently the case. Since the change is likely to impact less than 30 aircraft on the busiest flying day and considering the mitigations put in place (e.g. NOTAM, DACS), the overall impact of the proposed change on noise is thought to be negligible.
- B8. Finally for this section on noise impacts, CAP 1616 requires change sponsors to confirm the minimum noise modelling category that is required to be applied to the airspace change. A rationale to scope out this requirement was provided in Stage 2 of the ACP based on the low numbers of aircraft which might be affected. The CAA was in agreement and a noise modelling category was, therefore, not stipulated for this ACP.

CO₂ Emissions and Fuel Burn

- B9. The MOD is considerate of the environmental impact of the proposed airspace and has sought a means to usefully determine any impact on civil air traffic's CO₂ emissions and fuel burn. It is felt that interrogation of digital software is unlikely to provide a robust means to do this as the MOD would have to make specific assumptions about numbers of affected aircraft which after due consideration might be difficult to justify. However, the Change Sponsor gathered feedback from aviation stakeholders during the Stage 2 engagement. Of the 32 stakeholders that responded, 13 provided specific information regarding their current frequency of usage of the proposed segregated airspace. It should be noted that their feedback was relative to the full set of initial airspace design options 1 – 6 as presented in Stage 2 engagement. Options 2 – 6 were discounted during Stage 2, so the Change Sponsor proposes that the usage estimates are likely to be somewhat inflated compared to estimates for Option 1 only. Nevertheless, it provides an opportunity for some quantitative assessment. The Change Sponsor has considered the low and medium airspace designs separately since there was a significant difference in the affected stakeholder communities.
- B10. **Low airspace design**
- B11. Of the 11 aviation stakeholders that responded, all carry radios and indicated that they routinely called ATC for a service. Eight of the respondents were based at Temple Bruer and would have been particularly affected by Stage 2 Options 2 – 6, which were discounted during the Stage 2 process. They are likely to be largely unaffected by Option 1, which is the low airspace design taken through to Stage 3, since it will not impede their egress and ingress to Temple Bruer. The average number of sorties per week which required access to the full range of low airspace design options was calculated by taking the sum of the

- B12. maximum weekly frequency given by each stakeholder and dividing the total by 11 (the number of stakeholders) as follows:

54.55 sorties / 11 = 4.95 sorties per week per respondent

Removing the respondents from Temple Bruer resulted in a calculation as follows:

3.5 sorties per week / 3 = 1.17 sorties per week per respondent

- B13. The MOD considers this to be a very small number and feels that it ties in with the quantitative estimate of overflights given by Waddington ATC, supported by the MATZ crossing data for 2019 similarly supplied by Waddington ATC during Stage 2. The Change Sponsor suggests that any further effort to calculate the impact on fuel burn and CO₂ emissions is unlikely to help stakeholders understand the issue and is disproportionate to the impact itself. The MOD proposes it is scoped out of this ACP.

B14. Medium airspace design

- B15. The affected aviation stakeholders for the medium airspace design options were largely military airspace users from the flying training squadrons at RAF Cranwell. These stakeholders will be able to request and obtain a DACS to operate within the segregated airspace and it is envisaged that there would be a high probability of success in gaining access. However, if access was not granted for a period when Protector was operating in a medium airspace design option, MOD aircraft from Cranwell would be most likely to carry out their general handling sorties at a lower level for the affected period or, by prior planning, would have selected an alternative piece of airspace to operate in. Rerouting around the segregated airspace would not necessarily be a requirement and so no additional fuel burn or CO₂ emissions would be incurred. Two civil airspace users recorded infrequent use of this airspace averaging a maximum combined usage of 3.5 sorties per annum.

- B16. As for the low airspace design, the Change Sponsor proposes that any further effort to calculate the impact on fuel burn and CO₂ emissions is unlikely to help stakeholders understand the issue and is disproportionate to the impact itself. The MOD proposes it is scoped out of this ACP.

- B17. As with noise, the Change Sponsor has considered the impact of the proposed airspace on CO₂ emissions and fuel burn from a qualitative point of view and similarly suggests that the proposed change will not result in an increase in the number of aircraft operating in the local area, nor will the aircraft types be altered. Therefore, whilst there might be a small number of aircraft that do not take advantage of the DACS in order to get a direct routing, the impact on CO₂ emissions and fuel burn is thought to be very low.

Air Quality

- B18. Air quality must be considered by Change Sponsors if the proposed airspace change is likely to:

- Bring about a change in aviation emissions (by volume or location) below 1000 feet, and
- The location of the emissions is within or adjacent to an identified Air Quality Management Area (AQMA).
-

- B19. The MOD has identified two locally situated AQMAs in the heart of the city of Lincoln, which are contained within the low airspace design. However, the fact that they are located within the lateral boundary of the airspace in question means that any civil air traffic affected by the airspace change will not be rerouting adjacent to the AQMAs. In addition regulation⁴ requires that in general, except when necessary for take-off or landing, an aircraft should not be below 1000 ft over a built-up area and so should not be crossing over Lincoln's AQMAs below 1000 ft. For this reason the MOD feels that air quality does not fall in scope of this ACP.

Tranquillity & Biodiversity

- B20. CAP 1616 also requires Change Sponsors to consider effects of new airspace on tranquillity and biodiversity. In a similar vein to the noise modelling requirement, the Change Sponsor proposed that formal assessment of effects on tranquillity and biodiversity was out of scope for this airspace change. The number of GA aircraft that currently request routing through Waddington's MATZ and overhead below 7000 ft AAL is deemed to be less than 30 on peak days according to Waddington ATC's qualitative assessment, The quantitative assessment discussed in para 14.2 and at Annex B supports this. Most of these aircraft will continue to request and obtain a DACS to cross the low airspace design, in their current manner with only a small percentage of them requiring a reroute due to activity within the segregated airspace. This small percentage may result in an interaction with some sensitive areas but the numbers are thought to be so small that the Change Sponsor proposed that a formal assessment would be disproportionate to the numbers of aircraft affected and should be scoped out. The CAA was in agreement.
- B21. The proposed airspace does not sit above any Areas of Outstanding Natural Beauty (AONB) or National Parks. The Lincolnshire Wolds AONB is located well to the north east of RAF Waddington and the airspace associated with this ACP. No specific sensitive or locally identified "tranquil" areas have been identified by stakeholders, but the MOD will be receptive to any such information being presented during the Stage 3 consultation. The Change Sponsor is committed to continue to work with RAF Waddington where possible in a neighbourly way to minimise overflight of sensitive areas. This is particularly relevant with regard to the RAFAT activity. Identified areas are specified within the RAF Waddington Defence Aerodrome Manual and the MOD has taken the initiative in detailing such sensitive areas to RAFAT.

⁴ Rules of the Air, Section 3 para 5(c) [Microsoft Word - ukSI_20070734_en.doc \(legislation.gov.uk\)](https://www.legislation.gov.uk/microsoft-word/uk/2007/0734/en.doc)