ACP-2019-18

GATEWAY DOCUMENTATION:
STAGE 2 DEVELOP & ASSESS

STEP 2B OPTIONS APPRAISAL (PHASE I) INITIAL
VERSION 2

Roles

Action	Role	Date
Produce	Airspace Change Team UAS CDC	12 Apr 22
Review	DAATM	12 Apr 22
Approve	Change Sponsor RAF AIR Cap	14 Apr 22

Drafting and Publication History

Issue	Date	Change Summary
1.0	14 Jan 22	Submitted to CAA
2.0	14 Apr 22	Submitted to CAA

Contents

Introduction

ACP-2019-18 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). There is also an emerging requirement 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 (see Reference A) on the CAA ACP Portal for details. In brief a revised Statement of Need was produced. In addition, a rationalisation of design principles was carried out to ensure that the design principles from the original RAFAT ACP were covered satisfactorily by those for ACP-2019-18.

The Ministry of Defence, 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.

The purpose of this document is to demonstrate that the Change Sponsor has followed CAP1616 airspace change process. It forms part of the overall requirements for the Stage 2 Develop and Assess Gateway, Step 2B – Options Appraisal. This is Version 2 of the Step 2B documentation, and includes some additions to the document to comply with the requirements of the airspace change process as laid down in CAP1616. In particular it contains a description of the Do-Nothing option describing a baseline for the current airspace structure and activities against which the airspace design options can be assessed.

Executive Summary

This airspace change 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.

The Change Sponsor developed a comprehensive range of airspace design options which were shared with a wide range of identified stakeholders including those who were engaged with in Stage 1B. Feedback on the design options was invited.

Stage 2B requires an initial appraisal of the impacts of the design options against a “do nothing” option. The chosen methodology was to conduct a simple qualitative assessment of the different options, both positive and negative, against the headings identified in CAP1616, Appendix E, Table E2: “Guide to expected approach to key analysis for a typical airspace change”. An initial indication of safety implications was also produced.

Section 1

1 Statement of Need

1.1 There is a requirement for a large Remotely Piloted Air System (RPAS) to operate out of RAF Waddington from the mid-2020s. Pursuit of an ACP optimises an approach, in terms of efficiency and safety, for RPAS to operate from and to RAF Waddington. Furthermore, this approach will support the safe integration of the RPAS into the national airspace structures, given the anticipated performance of on-board systems and the surrounding airspace classification. Access to existing training areas around the UK will also be considered as part of the integration into the national airspace structures. There is an emerging requirement for the RAF Aerobatic Team to conduct display flying activity over RAF Waddington from early 2023 following the Team's relocation from RAF Scampton in late 2022. Integration of this requirement within the Protector ACP is considered the safest operating model.

2 Design Principles

Table 1 - ACP-2019-18 Design Principles

Priority	Design Principle
1	DP(a) Provide a safe environment for airspace users *including consideration of the risk to life of those on the ground during RAFAT display practices*
2	DP(b) Provide access to sufficient area for both training and operational objectives
3	DP(c) Where possible and practicable, accommodate the emerging Airspace Modernisation Strategy DP(d) Minimise the impact to other airspace users
4	DP(e) Endeavour to make the airspace as accessible as possible DP(f) Use Flexible Use of Airspace (FUA) principles to manage the airspace as far as is practicable (Efficiency and Airspace Sharing)
5	DP(g) Use standard airspace structure where possible (Conformity, Simplicity and Safety)

3 Design options summary

3.1 The MOD prepared a comprehensive range of airspace design options upon which it invited feedback and comment from a range of stakeholders. The options were broken into two categories:

a. Airspace designs for the airspace in the vicinity of RAF Waddington below 9500 ft above mean sea level (AMSL) (known as **low level airspace design options**);
b. Airspace designs for the airspace in the vicinity of RAF Waddington 9500 ft AMSL – FL195 (known as **medium level airspace design options**).

4 Low Level Airspace Design Options:

4.1 The MOD prepared six low level airspace design options for the airspace in the vicinity of RAF Waddington below 9500 ft AMSL. Only one of low level airspace design options would be required to accommodate both Protector and RAFAT activity.

4.2 In Mar 22, following continued collaboration with GA-ASI, the manufacturer of Protector, the MOD was advised that the Protector activity could be contained within the airspace depicted in Option 1 LOW without unacceptable impact on safety or operational capability. Option 1 LOW will accommodate the RAFAT activity.

4.3 Options 2 – 6 LOW were evaluated as not meeting DP(d) "*minimise the impact to other airspace users",* during the design principle evaluation in Step 2A and they have, therefore, been discounted. Options 3, 4, and 5 LOW also add a small degree of complexity compared with Option 1 LOW. Option 6 LOW added more complexity compared with Options 3, 4 and 5 LOW. Finally Option 2 LOW, whilst it was simple in design, had the largest volume of airspace and would, therefore, have a larger impact on other airspace users. Option 1 LOW has the smallest volume of airspace and, without stubs, it will reduce the impact on operations at Wickenby and Temple Bruer particularly. Option 1 LOW is taken through to the Options Appraisal.

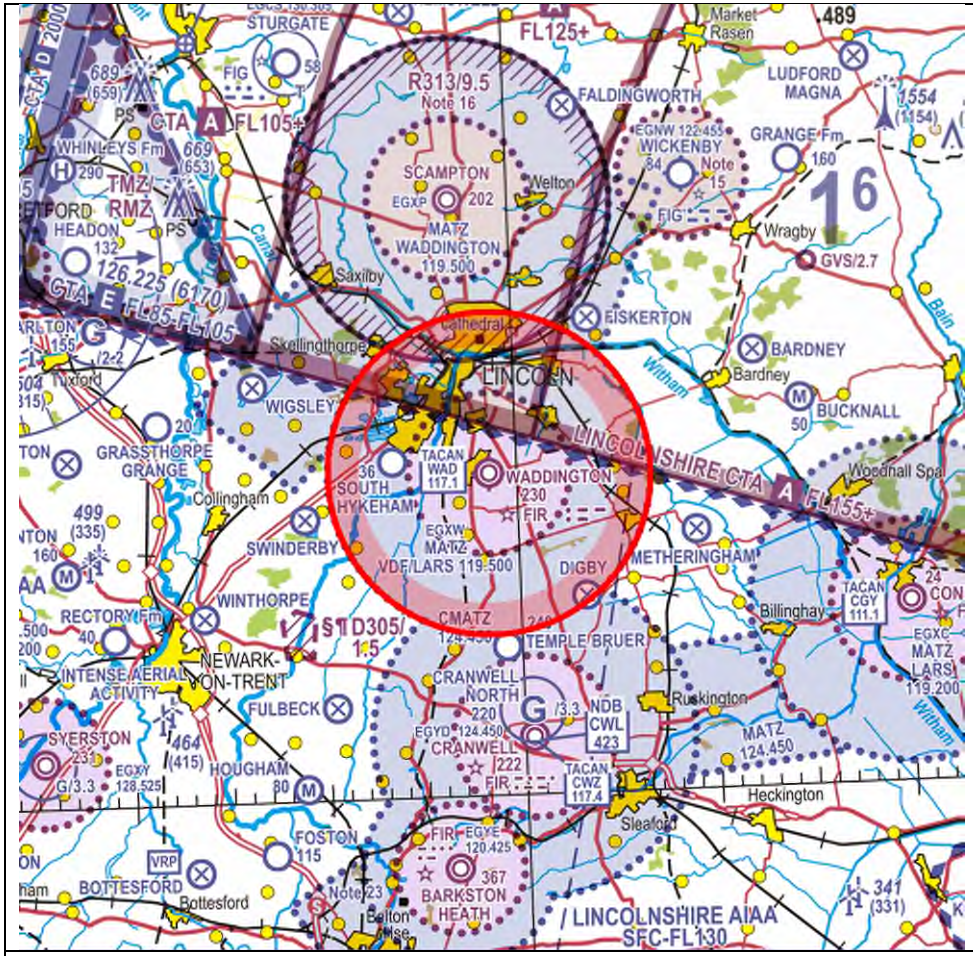
4.4 Option 1 LOW is intended for use as follows:

a. Protector will use this airspace:
   - o During departure from RAF Waddington's main runway. It will execute its automatic take-off profile and perform a spiral climb to 9500 ft AMSL when it will enter one of the medium level airspace design options;
   - o During recovery to RAF Waddington. It will enter the Option 1 LOW at 9500 ft AMSL from one of the medium level airspace design options. It will then perform a spiral descent and execute its automatic landing profile to the main runway;
   - o During necessary live-flying training sorties, it may remain wholly within Option 1 LOW.

b. RAFAT will use this airspace to conduct its flying display practices from surface to 9500 ft AMSL.

4.5 The MOD selected 9500 ft AMSL as the upper level for the low level airspace design options in order to safely accommodate the RAFAT display activity. Since there has to be an onward connection with the medium level airspace design options to enable Protector to continue its climb to access classes A & C airspace, the medium level airspace design options have a lower level of 9500 ft AMSL.

4.6 The MOD is reasonably flexible in the choice of upper limit of Option 1 LOW; the deciding factors are that it must be high enough to safely accommodate the RAFAT activity and must enable connection to the medium level airspace design options. Option 1 LOW is as follows:



Lateral Dimension: 5 nm radius circle centred on RAF Waddington's aerodrome reference point[1] (ARP).

Option 1 LOW

Activation:
Option 1 would be used for both RAFAT and Protector activities.

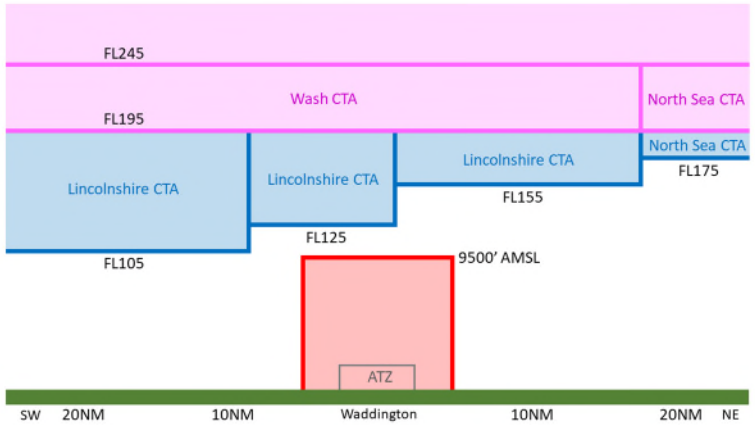


Figure 1- Cross-section SW/NE through extended centreline for RW02/20

Vertical Dimension: Surface to 9500 ft AMSL.

[1] RAF Waddington's airfield reference point is the midpoint of RW02/20 (530958N 0003126W)

5 Medium Level Airspace Design Options

5.1 The MOD prepared two airspace design options for the airspace in the vicinity of RAF Waddington between 9500 ft AMSL and FL195. Options 7 and 8 MEDIUM are located directly beneath Class C airspace, which during specified hours[2] is activated as a Temporary Reserved Area (TRA). The MOD is aware that a robust argument must be made for an active TRA to be considered a safe environment for Protector operation and is working on this argument. The upper limit of FL195 for Options 7 and 8 MEDIUM is predicated on this argument being able to be made.

5.2 Internal MOD analysis of the likely flight profiles for the Protector activity in the medium level airspace design options, suggests that a compromise between Options 7 and 8 MEDIUM could be appropriate. Further work is to be carried out on this including the development of a robust argument with respect to the CAA Safety Buffer Policy. A refinement of Option 8 MEDIUM is also being considered, with potential to shave off the south-western corner of the airspace to minimise the impact on paradropping activity from Langar airfield. .Other refinements are also being considered which may result in a middle-ground between Options 7 and 8 MEDIUM,

5.3 The RAFAT activity will not require access to either of the medium level airspace design options.

5.4 The medium level airspace design options are as follows:

[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.

Option 7 MEDIUM

Activation:
Provided a safety argument can be made with respect to the CAA Safety Buffer Policy, Option 7 would be activated for Protector activity only, to enable Protector to continue climb into classes A and/or C airspace.

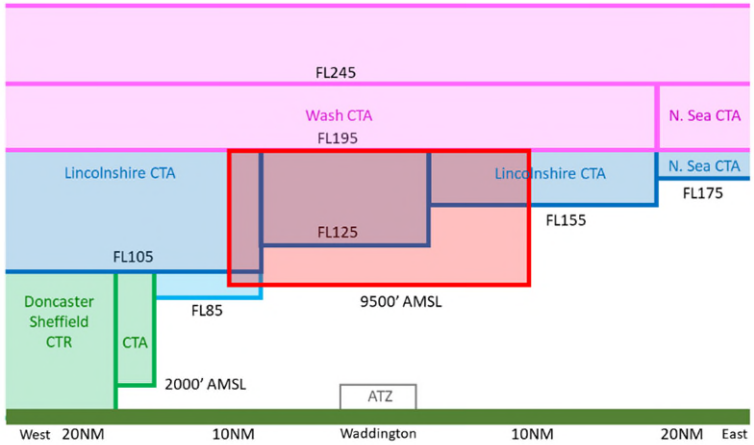


Figure 2 - Cross-section through a line running parallel to the abutting Lincolnshire CTA

Lateral Dimension: 20 x 10 nm rectangle aligned to and abutting the southern edge of the Lincs CTA.

Vertical Dimension: 9500 ft AMSL – FL195

Option 8 MEDIUM

Activation:
In the event that the safety argument determines that the additional airspace is required to satisfy the CAA Safety Buffer Policy, Option 8 would be activated for Protector-only activity to enable Protector to continue climb into classes A and/or C airspace.

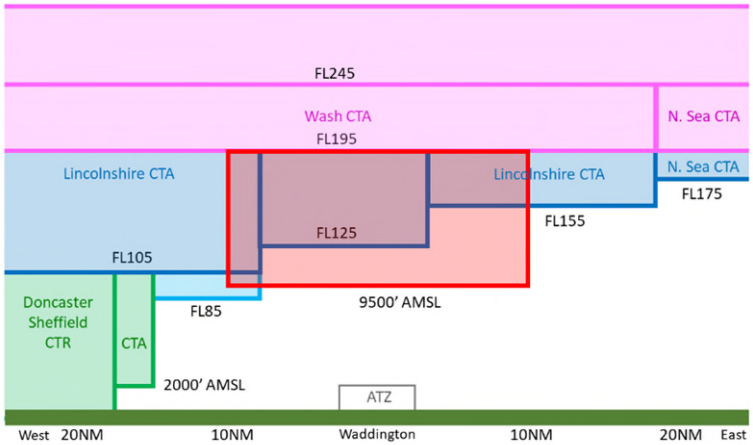


Figure 3 - Cross-section through a line running parallel to the abutting Lincolnshire CTA

Lateral Dimension: 20 x 20 nm rectangle aligned to and abutting the southern edge of the Lincs CTA.

Vertical Dimension: 9500 ft AMSL – FL195

6 Type of Airspace to Accommodate RAFAT and Protector Activities

6.1 RAF Waddington sits entirely within class G airspace, which ordinarily does not provide adequate protection or segregation respectively for RAFAT and Protector at Initial Operating Capability (IOC). The MOD has given much thought to the most appropriate type of airspace to accommodate both activities and a summary follows, taken in turn by each activity and then further summarised in Table below.

6.2 **RAFAT** - The RAFAT activity is afforded additional protection at RAF Scampton through the establishment of EG R313, which is restricted airspace and active on a permanent basis Monday – Friday. This structure is a 5 nm radius cylinder of airspace reaching from surface to 9500 ft AMSL (specified as Regional Pressure Setting). Thought has been given to providing similar protection at RAF Waddington. However, it is felt that an equal measure of protection could be achieved via a less permanent structure, particularly since during RAFAT activity full radar surveillance and air traffic services would be provided by military ATC.

6.3 **Protector** – In broad terms civil and military regulations specify that without an appropriately approved Detect and Avoid (DAA) capability, Protector must be flown using a Layered Safety Approach that specifically requires flight in segregated airspace. Protector is fitted with TCAS II, which may be approved to provide a DAA capability in airspace where all traffic can be expected to be operating a transponder (i.e. transponder-mandatory airspace). The MOD is producing an Airspace Integration Safety Argument (AISA) for the introduction of Protector at IOC into UK airspace. This work aims to develop an evidenced argument for the safe operation of IOC Protector under Instrument Flight Rules (IFR) and under an air traffic service within transponder-mandatory airspace, as well as in suitable segregated airspace. The AISA is therefore looking at the following types of airspace:

a. Class A airspace:
b. Class C airspace;
c. Class D airspace that is notified as a Transponder Mandatory Zone (TMZ)[3];
d. Class E airspace that is notified as a TMZ, although it is thought to be less likely to be able to produce an acceptable safety argument;
e. Class G airspace, segregated in the form of a notified Danger Area.

[3] Class D is usually designated around an aerodrome, hence not above FL100

Table 2 - Proposed Airspace Types for Consideration with MOD Comment

Type of segregated airspace	Suitability for RAFAT	Suitability for Protector	MOD Comment
Class A	No	Yes	IFR flight is mandatory in class A airspace, which is not suitable for RAFAT
Class C	Yes	Yes	Not justifiable in terms of: o Restrictions placed on other airspace users; o Air traffic management resourcing; o Flexible use of airspace (notified hours of activation in UK AIP).[4]
Airspace Class D above FL100 or if below FL100 is also a TMZ[5]	Yes	Yes	Not justifiable in terms of: o Restrictions placed on other airspace users; o Air traffic management resourcing; o Flexible use of airspace (notified hours of activation in UK AIP).
Class E	Unknown	Unknown	Pending AISA for Protector, but thought unlikely to be suitable.
Class G Danger Area	Yes	Yes	Less impact on other airspace users since it can be tactically managed (does not have notified hours of activation in UK AIP).
TMZ/RMZ	No	Possibly	Not considered viable for RAFAT

6.4 The establishment of a class G restricted area was considered and discounted, as it was thought to be an overly restrictive option in terms of access to other airspace users. Whilst access to a restricted area can be managed by ATC, the aviation community is familiar with the danger area construct and the ability to obtain a Danger Area Crossing Service (DACS). Protector does not require the additional level of protection afforded by restricted airspace. Radar surveillance provision and air traffic services provided by military ATC would ensure that the establishment of a danger area for RAFAT activities would constitute adequate protection. It is envisaged, therefore, that the most economical type of airspace to be implemented (in terms of hours of activation, access to airspace and manpower resource) would be segregated airspace in the form of a danger area.

[4] Whilst there is current discussion regarding the possibility of tactically turning controlled airspace volumes on and off, the likely timescale involved precludes it as an option for this ACP.

[5] TMZ = Transponder Mandatory Zone.

Section 2

7 Methodology

7.1 Stage 2B requires an initial appraisal of the impacts of the design options presented in Section 1 against a “do nothing” option.

7.2 The chosen methodology is to conduct a simple qualitative assessment of the different options, both positive and negative, against the headings identified in CAP1616, Appendix E, Table E2: “Guide to expected approach to key analysis for a typical airspace change”. This approach has been applied previously in other Airspace Change Proposals of similar scale/proportionality that have successfully passed the Stage 2 Gateway and it has been deemed compliant both with the spirit of CAP1616 and the Government Green Book.

8 The Do-Nothing option

8.1 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. In such cases CAP1616 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 4. The baseline is as follows.

8.2 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. E-3D Sentry AEW1, which was retired from active service in 2021 although is continuing an out-of-service training role.

d. Waddington Flying Club - a civilian flying club which operates PA28 and Tecnam P2008JC for flying training throughout the week and weekends.

Figure 4– Local Area Airspace

8.3 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 RAF Scampton is the home of RAFAT, which uses EG R313 throughout the year for aerobatic display practices[6]. 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.

8.4 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 hours[7] much of the airspace over Lincolnshire is activated as a Temporary Reserved Area (TRA). Although the background classification between FL195 and FL245

[6] RAFAT is due to be relocated to RAF Waddington by end December 2022 following the closure of RAF Scampton (this is further explained in this ACP submission documentation).

[7] 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.

is Class C, to avoid operational restrictions, military aircraft may operate autonomously or in be 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.

8.5 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.

8.6 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.

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

8.8 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:

a. 0800 – 2359 Mon – Thu
b. 0800 – 1800 Fri

8.9 **Military aviation activity in current airspace construct.**

8.10 The MOD has presented 6 airspace design options up to 9500 ft AMSL directly over RAF Waddington to provide segregation for the Protector and RAFAT activities. The following paragraph endeavours to broadly describe the current military aviation activity in that airspace. Whilst military aviation is not wholly predictable, a typical day at RAF Waddington might be as follows. Rivet Joint and E3D 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.

8.11 The airspace design options presented to segregate Protector activity from 9500 ft – 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 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.

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

8.13 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 9500 ft – 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 5 below.

Figure 5 – Langar Skydive Operating Area

9 Options appraisal

9.1 Table 3 details the appraisal of Option 1 LOW and the "Do-Nothing" baseline option against the high-level objectives and assessment criteria laid out in CAP1616, Appendix E, Table E2.

9.2 Over and above the requirement in CAP1616 Appendix E, Table E2, an additional row has been added to the table outlining initial safety considerations in brief. The list is not exhaustive and will be expanded as required as the options appraisal in matured.

Table 3 – Summary of options appraisal for Option 1 LOW

Group	Impact	Option 1 LOW	Do-Nothing
Communities	Noise impact on health and quality of life	**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 Option 1 LOW 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 Option 1 LOW extends above the MATZ to 9500 ft AMSL. Waddington ATC reports few civil aircraft transit within 5 nm from Waddington between 3000 ft AAL and 9500 ft AMSL 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 re-routing 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 carry radios and speak to ATC so rerouting could be minimised. It is considered that any consequential impact on noise and therefore on health and quality of life from this option is very low over and above the impact of the Do-Nothing option. **Protector** is powered by a Honeywell TPE331-10 Turboprop engine; more information regarding	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. There is the likelihood that some rerouting already occurs below 3000 ft AAL under the Do-Nothing option which would already impact health and quality of life.

Table 3 – Summary of options appraisal for Option 1 LOW

Group	Impact	Option 1 LOW	Do-Nothing
		noise can be ascertained to estimate the impact of noise over and above the Do-Nothing option. **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.	
Communities	Air Quality	**Civil aircraft:** Minimal reduction in overall air quality thought to be likely as establishment of segregated airspace should lead to minimal reroute of GA aircraft. **Protector** is powered by a Honeywell TPE331-10 Turboprop engine; more information regarding emissions can be ascertained to estimate effect on air quality. **RAFAT** activity will be largely switching display practice locations between RAF Scampton and RAF Waddington. No additional reduction in air quality but will affect different communities.	Neither RAFAT nor Protector would be able to fly at RAF Waddington, so there would be no reduction in air quality from any new activity. No reduction in air quality 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 air quality.
Wider society	Greenhouse gas impact	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. Estimated Protector flying tempo is 1 - 2 flights per week initially, although requirement is evolving. Change sponsor can firm up estimate. No additional flying anticipated from RAFAT. 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.	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. No increase in greenhouse gas 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

Table 3 – Summary of options appraisal for Option 1 LOW

Group	Impact	Option 1 LOW	Do-Nothing
			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 level airspace design options by GA. Estimated initial Protector flying tempo will require activation of segregated airspace 1 – 2 days per week. Protector will spend minimal time (approximately 10 minutes during departure or recovery phase) in any of the low level airspace design options. Access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Access to the low level airspace design options 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 will endeavour to provide this for Phase II appraisal.	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.
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. Estimate of impact can be refined by reference to stakeholders and interrogative software (MOD is investigating).	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

Table 3 – Summary of options appraisal for Option 1 LOW

Group	Impact	Option 1 LOW	Do-Nothing
			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
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)		• 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

9.3 Tables 4 and 5 detail the appraisal of the medium level airspace design options and the "do nothing" option against the high-level objectives and assessment criteria laid out in CAP1616, Appendix E, Table E2. Both medium level airspace design options have been represented together in Table 3, since at this early stage of appraisal their impacts seem to be almost identical. Where a potential difference has been identified, this has been made clear in the table.

Table 4 – Summary of options appraisal for Option 7 MEDIUM

Group	Impact	Option 7 MEDIUM	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 9500 ft AMSL	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 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 for short duration and above 9500 ft AMSL	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 Option 7 MEDIUM, so the consequential impact of this option is likely to be negligible in terms of greenhouse gases. Estimated Protector flying tempo is 1 - 2 flights per week initially, although requirement is evolving. Change sponsor can firm up estimate. 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.	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 above 9500 ft AMSL would remain unaltered.

Table 4 – Summary of options appraisal for Option 7 MEDIUM

Group	Impact	Option 7 MEDIUM	Do-Nothing
General Aviation	Access	Estimated Protector flying tempo will require activation of segregated airspace 1 – 2 days per week and will spend very little time in the medium level airspace design options. Whilst feedback from stakeholders revealed that few operated within the medium level airspace design options, access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS).	There would be no change from present since the airspace above 9500 ft AMSL 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/ joining controlled airspace. 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 9500 ft AMSL would remain unaltered.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Not applicable	Not applicable
General Aviation / commercial airlines	Fuel burn	Unlikely to have any impact on fuel burn since few GA operate above 9500 ft AMSL. Estimate of impact can be refined by reference to stakeholders and interrogative software (MOD is investigating).	Unlikely to have any impact on fuel burn since few GA operate above 9500 ft AMSL.
Commercial airlines	Training costs	Not applicable	Not applicable
Commercial airlines	Other costs	Not applicable	Not applicable
Airport /ANSP	Infrastructure costs	Not applicable	Not applicable

Table 4 – Summary of options appraisal for Option 7 MEDIUM

Group	Impact	Option 7 MEDIUM	Do-Nothing
Airport /ANSP	Operational costs	Not applicable	Not applicable
Airport /ANSP	Deployment costs	Not applicable	Not applicable
Safety Considerations (not exhaustive list)		• 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

Table 5 – Summary of options appraisal for Option 8 MEDIUM

Group	Impact	Option 8 MEDIUM	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 9500 ft AMSL	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 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 for short duration and above 9500 ft AMSL	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

Table 5 – Summary of options appraisal for Option 8 MEDIUM

Group	Impact	Option 8 MEDIUM	Do-Nothing
Wider society	Greenhouse gas impact	Feedback from stakeholders and Waddington ATC suggest very few civil airspace users access the segregated airspace associate with Option 8 MEDIUM for transit purposes, so the consequential impact of this option is likely to be negligible in terms of greenhouse gases. However, good use is made of the south-western corner by Skydive Langar (please see Access Section for detail). The MOD would find a means to accommodate this activity without causing an increase in greenhouse gas. Estimated Protector flying tempo is 1 - 2 flights per week initially, although requirement is evolving. Change sponsor can firm up estimate. 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.	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 above 9500 ft AMSL would remain unaltered.
General Aviation	Access	Estimated Protector flying tempo will require activation of segregated airspace 1 – 2 days per week and will spend very little time in the medium level airspace design options. Whilst feedback from stakeholders revealed that few operated within the medium level airspace design options, access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Access by Skydive Langar, a local paradropping school could be problematic. The Change Sponsor is confident that this option can be redesigned to remove the impact on Skydive Langar.	There would be no change from present since the airspace above 9500 ft AMSL would remain unaltered.

Table 5 – Summary of options appraisal for Option 8 MEDIUM

Group	Impact	Option 8 MEDIUM	Do-Nothing
MOD/RAF Aviation	Access	May be some impact on access for MOD/RAF aviation conducting training sorties up to FL120 and accessing Gamston Corridor/ joining controlled airspace. Impact should be minimal since military pilots are normally under a service and speaking to ATC.	There would be no change from present since the airspace above 9500 ft AMSL would remain unaltered.
General Aviation / commercial airlines	Economic impact from increased effective capacity	Not applicable	Not applicable
General Aviation / commercial airlines	Fuel burn	Unlikely to have any impact on fuel burn since few GA operate above 9500 ft AMSL. Estimate of impact can be refined by reference to stakeholders and interrogative software (MOD is investigating).	There would be no change from present since the airspace above 9500 ft AMSL would remain unaltered.
Commercial airlines	Training costs	Not applicable	Not applicable
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)		• Pilots being unaware of new airspace • Re-route through unfamiliar airspace (proximity to controlled airspace) • Funnelling as a result of need to re-route	There would be no additional safety considerations since neither activities would be able to operate at RAF Waddington

Table 5 – Summary of options appraisal for Option 8 MEDIUM

Group	Impact	Option 8 MEDIUM	Do-Nothing
		• 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	

10 Summary of preferred options

10.1 Low level airspace design option

10.2 Option 1 LOW has been confirmed as a viable airspace design option for both the Protector and RAFAT activities. As it is the option which has the least impact on all other airspace users within the low level airspace design options and the only option that meets all of the design principles, it is the only low level airspace design option that the MOD will take through to Stage 3 of the ACP.

10.3 Medium level airspace design options

10.4 Following the DP evaluation the MOD has decided to take both Options 7 MEDIUM and 8 MEDIUM through to Stage 3 of the ACP. Internal MOD analysis of the likely flight profiles for the Protector activity in the medium level airspace design options, suggests that a compromise between Options 7 and 8 MEDIUM could be appropriate. Further work is to be carried out on this including the development of a robust argument with respect to the CAA Safety Buffer Policy. A redesign of Option 8 MEDIUM is also being considered, with potential to shave off the south-western corner of the airspace to minimise the impact on paradropping activity from Langar airfield.

10.5 In order of preference the MOD prefers Option 7 MEDIUM, since it is the smaller volume of airspace in the medium level airspace design options category. However, as stated above a middle-ground between Options 7 and 8 MEDIUM is likely to be sought if Option 7 MEDIUM is not adequate to accommodate Protector's flight profile.

11 Evidence to be collected for Options Appraisal (Phase II) Full

11.1 The Change Sponsor will collect or firm up the following information to inform the next stage of the Options Appraisal:

a. 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;

b. 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;

c. 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;

d. 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;

e. 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.

12 10 Year Traffic Forecast

12.1 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 until Jul 2022); 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.

12.2 Following on from this likely reduction in movements at RAF Waddington, forecasting out to 10 years is a challenging task from a MOD perspective. No further reductions are foreseen, whilst the introduction of RAFAT and Protector to the aerodrome are anticipated. The number of RAFAT movements will probably remain stable within the local area, with the shift of operating base from RAF Scampton to RAF Waddington later this year. In addition no major rebasing activities are planned. That said, defence is likely to see an increase in transit traffic to the east and north of Lincolnshire as more F-35 aircraft come into service and make use of the EG D323 range complex. The MOD is not aware of any significant forecast increase in civil traffic in the local area, from both the commercial and GA perspective.

12.3 In summary, the MOD forecasts no increase in air traffic as a result of this airspace change for the years 2023 – 2033 inclusive.

13 Assessment of noise impact and high level assessment of other costs and benefits for each airspace design option

13.1 CAP1616 requires the Change Sponsor to provide an indication of the likely noise impact for each design and a high level assessment of other costs and benefits. An initial summary is offered in **Error! Reference source not found.**Table 6 below:

Table 6 - Summary of likely noise impact and high level assessment of other costs and benefits

Airspace Design Option	Likely Noise Impact	Other Costs and Benefits
Do-Nothing Option	**Civil aircraft:** Zero additional noise impact since civil pilots would carry on as they do now – ATZ and MATZ would still be in existence. **Protector**: Protector would not be able to fly from RAF Waddington, so no increased noise impact from any new flying activity.	The air quality, greenhouse gas emissions, access to airspace and fuel burn will all remain the same as now. That said, as above it should be recognised that where rerouting of aircraft might be required by any new airspace

Table 6 - Summary of likely noise impact and high level assessment of other costs and benefits

Airspace Design Option	Likely Noise Impact	Other Costs and Benefits
	RAFAT: RAFAT would not be able to fly from RAF Waddington, so no increased noise impact from any new flying activity.	implemented below 3000 ft AGL, there is the likelihood that rerouting already occurs under the Do-Nothing option.
Option 1 LOW .	**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 Option 1 LOW 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 Option 1 LOW extends above the MATZ to 9500 ft AMSL. Waddington ATC reports few civil aircraft transit within 5 nm from Waddington between 3000 ft AAL and 9500 ft AMSL 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 re-routing 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. Majority of stakeholders who provided feedback carry radios and speak to ATC so rerouting could be minimised. Any consequential noise impact from this option is considered to be very low. **Protector** is powered by a Honeywell TPE331-10 Turboprop engine; more information regarding noise can be ascertained to estimate noise impact. **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.	Air quality: Potential minimal reduction in air quality if rerouting is required. Greenhouse gas: 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. No additional flying anticipated from RAFAT. Minimal increase in greenhouse gas anticipated from Protector activity, although overall reduction in impact is likely in local area due to relocation/retirement of several flying assets from RAF Waddington. Access: There may be a small impact on ease of access by GA. Estimated initial Protector flying tempo will require activation of segregated airspace 1 – 2 days per week. Protector will spend minimal time (approximately 10 minutes during departure or recovery phase) in any of the low level airspace design options. Access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Access to the low level airspace design options is likely to be impacted during RAFAT display practices, but this should be balanced against the ability for aircraft to access the airspace over Scampton. Fuel burn:

Table 6 - Summary of likely noise impact and high level assessment of other costs and benefits

Airspace Design Option	Likely Noise Impact	Other Costs and Benefits
		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.
Option 7 MEDIUM	No noise impact anticipated as Protector only operating in segregated airspace for short duration and above 9500 ft AMSL	Air quality: No reduction in air quality anticipated as Protector only operating in segregated airspace for short duration and above 9500 ft AMSL Greenhouse gas: 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. Access: Estimated Protector flying tempo will require activation of segregated airspace 1 – 2 days per week and will spend very little time in the medium level airspace design options. Whilst feedback from civil stakeholders revealed that few operated within the medium level airspace design options, access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Military airspace users operate in this area, but little impact is anticipated since most will be speaking to ATC and can obtain a DACS. Simultaneous access is not precluded whilst Protector is operating. 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.

Table 6 - Summary of likely noise impact and high level assessment of other costs and benefits

Airspace Design Option	Likely Noise Impact	Other Costs and Benefits
		Fuel burn: Unlikely to have any impact on fuel burn since few GA operate above 9500 ft AMSL.
Option 8 MEDIUM	No noise impact anticipated as Protector only operating in segregated airspace for short duration and above 9500 ft AMSL	Air quality: No reduction in air quality anticipated as Protector only operating in segregated airspace for short duration and above 9500 ft AMSL Greenhouse gas: 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. Access: Estimated Protector flying tempo will require activation of segregated airspace 1 – 2 days per week and will spend very little time in medium level airspace design options. Whilst feedback from civil stakeholders revealed that few operated within the medium level airspace design options, access by GA will be maximised by the ability to obtain a crossing service (e.g. DACS). Access by Skydive Langar, a local paradropping school could be problematic for this option, unless a refinement of it is managed. Military airspace users operate in this area, but little impact is anticipated since most will be speaking to ATC and can obtain a DACS. Simultaneous access is not precluded whilst Protector is operating. Fuel burn:

Table 6 - Summary of likely noise impact and high level assessment of other costs and benefits

Airspace Design Option	Likely Noise Impact	Other Costs and Benefits
		Unlikely to have any impact on fuel burn since few GA operate above 9500 ft AMSL.

14 Noise modelling requirement

14.1 CAP1616 also requires Change Sponsors to confirm the minimum noise modelling category that is required to be applied to the airspace change. In considering what level of noise modelling is required, the MOD has obtained a qualitative assessment of the potential consequential effect of the low level airspace design options on civil traffic from ATC at 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.

14.2 Supporting quantitative evidence has also been obtained from Waddington ATC in the form of 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 included in the email from Waddington ATC at Annex B. 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.

14.3 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 level airspace design option, with only a small percentage of them requiring a reroute due to activity within the segregated airspace. It it is felt that the requirement for noise modelling as per CAP2091 is disproportionate to the numbers of aircraft which might be affected and, therefore, the Change Sponsor requests that formal noise modelling be scoped out of the airspace change requirement. Therefore, the Change Sponsor has not confirmed a noise modelling category for this ACP.

15 Tranquillity and biodiversity

15.1 CAP1616 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 proposes that formal assessment of effects on tranquillity and biodiversity as 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 level airspace design option, 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 proposes a formal assessment would be disproportionate to the numbers of aircraft affected and should be scoped out. That said, the Change Sponsor will continue to work with RAF Waddington where possible in a neighbourly way to minimise overflight of sensitive areas.

16 Safety assessment

16.1 It is useful to describe why specifically segregated airspace is being requested for the Protector and RAFAT activities at RAF Waddington.

16.2 **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.

16.3 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. The working assumption is that Protector will be able to fly within classes A and C airspace without restriction. Since RAF Waddington is located within class G airspace, some form of airspace segregation is required for its transit through current class G airspace in order to be able to achieve onward transit using classes A and C airspace.

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

16.5 **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.

16.6 A statement prepared by RAFAT is at Annex A; it outlines how its displays are managed from a safety perspective.

16.7 Para 6 outlines the MOD's preference 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 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. To ensure minimum disruption to other airspace users a DACS will be offered 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 under a clearance from either RAF Waddington or Swanwick Military.

b. RAF Waddington ATC will be manned at all times during RAFAT and Protector operations. Information on the current status of the airspace will be available, including a DACS from RAF Waddington or other appropriate military ATC units.

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 level airspace design options 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 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. This will:

    - Minimise the requirement for re-routing of civil or military airspace users

    - 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 intends to 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:

    - 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 and dealing with airspace crossing requests (e.g. DACS)

16.8 As the initial options appraisal indicates, the Change Sponsor must 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, 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.

Section 3

17 Next steps in this proposal

17.1 This document will be submitted to the CAA as evidence to support the ACP-2019-18 Stage 2B.

17.2 It is part of the documentary evidence for the Stage 2 Assessment Gateway (document deadline 15 Apr 22, for the CAA's Assessment Gateway scheduled for 29 Apr 22).

17.3 The following CAP1616 timeline is anticipated:

Event as per CAP 1616	**Planned Date**
Stage 3 – Consult	29 Jul 22
Stage 4 – Update and Submit	20 Mar 23
Stage 5 - Decide	31 Jul 23
Stage 6 - Implement	30 Nov 23

Annex A

RAFAT ACP IMPACT STATEMENT

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 aerobatics in formations of up to 9 aircraft. Team training in the UK typically takes place from late September to late March using protected airspace over the Teams home-base at RAF Scampton. This airspace is 5nm radius up to 9300ft AGL and is known 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. Typically, in early March, the Team are able to 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 for warmer climes and perfect their display routine abroad, typically in Greece and/or Cyprus. Following the Teams return to the UK in mid-late May, the display season typically provides the currency the Team need to keep their routine honed and consequently, practice display flying is infrequent during the summer months.

Airspace.
Having protected airspace is essential for the safety of the Team pilots and other airspace users. When display flying, the Team generally fly at 360kts, from 100ft AGL up to approximately 8000ft 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. Following the decision to sell RAF Scampton, the Team will relocate to RAF Waddington in late 2022. While the Team plan to continue to focus almost entirely on the use of EG R313 for its training requirements, occasional use of RAF Waddington has been identified as best practice. This scenario is discussed in option 1 below. A more recent development has required further analysis of all future RAFAT training and this is discussed in option 2 below.

Option 1 (preferred). Occasional 30-minute practice slots over RAF Waddington are being considered to allow the Team to bed-in at their new home-base. This would allow the Teams important corporate visit and PR programme to continue without the complications of having to bus people to/from Scampton. Supervision of the Team would also be better served at their home-base and there are many other good reasons for considering this option. It must be stressed that this preferred option will only see infrequent RAFAT flying over RAF Waddington utilising protected airspace proposed under this ACP. 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 option 2 below be required in the longer-term.

Option 2. A recent development now threatens the future of EG R313 beyond April 2023, and it is conceivable that EG R313 will be removed at some point at, or after this date. 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 potentially see greater use of RAF Waddington and the protected airspace being proposed by this ACP. To ensure the site is suitable for such activity, option 1 will provide invaluable test and evaluation data as it is not yet known just how suitable the site will be. It must be stressed that if option 2 is used, EG R313 will be permanently removed.

Conclusion. The Teams preference is to retain the current status quo, with a near 100% focus on the continued use of EG R313, with occasional, short duration display slots overhead RAF Waddington. However, challenges surrounding the Teams move to RAF Waddington and the recent development of a threat to the very future of EG R313 itself has led to a requirement to look

at using alternative airspace. Without protected airspace, the risk of mid-air collision would be unacceptably high, and the RAF has a duty of care to mitigate risks and create an operating environment that is safe for all users. Through flexible use of airspace and the hope that EG R313 can continue to be used indefinitely, it is considered highly likely that any impact to other airspace users while RAFAT operate over RAF Waddington will be very limited. Should EG R313 become unusable, RAF Waddington may be used as one of a number of MOD sites used for Team training but in this situation, EG R313 will be permanently removed.

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

Archived: 14 April 2022 10:45:02
From: [redacted]
Sent: 12 April 2022 12:42:53
To: [redacted]
Cc: [redacted]
Subject: Re: UC Contact details for MATZ- crosser data.
Sensitivity: Normal

Ali,

Our spreadsheet record for 2019, is corrupt Jun-Dec incl, however, I do have access to our paper record, due to extensive work on the Henlow MANC project using 2019 data. The results are in the table below, do get back to me should you have any queries or need anything further.

2019	M-F	Weekend
Jan	30	0
Feb	39	0
Mar	39	0
Apr	45	1
May	76	2
Jun	58	5
Jul	68	0
Aug	76	0
Sep	48	0
Oct	68	0
Nov	34	0
Dec	26	0
Totals	607	8

Kind regards,

[redacted]

[redacted] | E1 - Air & Space Operations Specialist | Air Traffic Control, RAF Waddington, Lincoln LN5 9NB | [redacted] |
MoDNet: [redacted]