



# Defence Infrastructure Organisation

## **FORMAL PROPOSAL FOR BEYOND VISUAL LINE OF SIGHT (BVLOS) REMOTELY PILOTED AIR SYSTEMS (RPAS) OPERATIONS IN EGD 128 - EVERLEIGH**

### **Introduction**

1. DIO SD Training, as Airspace Sponsor, seeks approval to conduct BVLOS RPAS operations within Danger Area D128 - Everleigh. The use of RPAS as an intelligence and surveillance asset is expanding across the military spectrum which, in turn, requires increased use of airspace to maximise training opportunities in order to meet Defence operational requirements. D128 is the most north-easterly portion of the Salisbury Plain Training Area (SPTA) Danger Area complex which comprises D123, D124, D125, D126 & D128. All areas, with the exception of D128, are currently authorised for the operation of BVLOS RPAS, hence a successful application will expand the training area available. The benefits of such approval are two-fold; firstly, it will enable small RPAS (<20Kg) training in the airspace close to the RPAS ground-school and, secondly, it will permit use of an austere location for large RPAS (>20Kg) operations.

### **Options**

2. Option 1 - Do nothing. The following points support the conclusion that the future requirements for training within existing airspace cannot be met by this option:
- a. The current areas utilized for RPAS training within the existing SPTA complex are limited due to simultaneous live ground firing or manned aircraft requirements. There are also advanced plans to relocate additional military rotary wing assets to the area, which will further increase demand on available airspace. This relocation of aircraft will, potentially, significantly further restrict RPAS training in the present airspace available.
  - b. A recent reassessment of army basing requirements has resulted in the RPAS (MUAS) training school being relocated from its site at Larkhill (within D125) to Upavon (within D128). Due to the non-availability of D128 for RPAS (BVLOS) operations, the initial phases of live flying for students' training currently have to be conducted at an alternative venue, incurring additional time and transportation costs.
  - c. The army's large RPAS have previously successfully flown from Boscombe Down aerodrome into the SPTA Danger Areas and will continue to do so as training

requirements increase. However, continuous development of the system and training to meet future operational requirements now necessitates an alternative launch/recovery site to be identified in order to train and assess large RPAS operations under austere conditions.

3. Option 2 – Use of alternative sites within D123, D124, D125 & D126 boundaries.

a. The projected uplift of manned aircraft to the area will lead to increased pressure for airspace availability within SPTA and all suitable sites for small RPAS within existing permissions are already being fully exploited.

b. For large RPAS ops, the austere operating environment includes a requirement for a suitable runway surface. Although a number of proposed sites within the boundaries of D123, D125 and D126 were investigated, none of these were ultimately considered suitable by the operating authority either due to proximity to Danger Area boundaries, prevalent wind, poor surfaces or conflict with other incompatible military requirements.

4. Option 3 – Utilization of D128 for BVLOS RPAS.

a. The ability to conduct BVLOS RPAS within D128 meets the requirements for both small and large RPAS. It will enable the small RPAS to be operated from the training school at Upavon and, most importantly, permit the operation of large RPAS from Netheravon, which is the only feasible site within the SPTA training area. This is the recommended option and is therefore the rationale for this submission. No other site outside of the SPTA with access to appropriate airspace has been identified as suitable or likely to be approved for this purpose.

**Airspace Description**

5. There is no requirement to change the existing dimensions of D128 and the airspace is published as active H24 throughout the year. It has an upper level of 1400ft asml, with provision for occasional use up to 50,000ft asml by NOTAM. Statistical information from the period Oct 16-Sep 17 for current use of additional airspace by NOTAM is as follows:

Activity	No. of NOTAM Activations	Requested Height
1. Flares		
a. Day	6	3000ft
b. Night	18	3000ft
2. Fast Jet/Outside Gun position	14	9000 – 20,000ft
3. ISTAR Fixed Wg	4	3000 – 9000ft
4. MUAS	3	2500ft
<b>TOTAL</b>	<b>45</b>	

## Notes:

1. It should be noted that many of the NOTAMed periods are for a specific limited number of hours to accommodate a training serial, not a full 24 hr period.
2. 18 of the NOTAMs were for night-time 'flare firings', which would not affect Day/VMC only GA operators.

## Airspace and Infrastructure Requirements

6. The airspace does not encroach within 5nm of national airways structures, therefore, no Lateral Buffer Zone, as defined by the SARG Policy Statement regarding Special Use Airspace – Safety Buffer Policy for Airspace Design Purposes, is required. For large RPAS flying, there will be a requirement to NOTAM D128 as active up to FL80. This upper level restriction will ensure that a minimum of 2000ft vertical separation exists between the Danger Area and the base of airway P2. For small RPAS, the upper level of the area will require additional airspace with an upper level of 2500ft.

## Adjacent Airspace Users

7. There are a number of other aircraft operators either based within or adjacent to the airspace and these have been consulted.
  - a. Thruxton. The South-Eastern boundary of D128 falls approximately 2 nm from the Thruxton Airport Air Traffic Zone. Consultation with Thruxton Airport has therefore been conducted where both parties explained their operating requirements. There was agreement that the proposed additional use of D128 would not have any adverse effects on aircraft flying from or to Thruxton Airport and Western Air, the operator, therefore raises no objections to the proposed course of action.
  - b. Boscombe Down (BDN). A Letter of Agreement (LoA) is extant with MOD Boscombe Down to de-conflict their traffic patterns with D128 airspace requirements. Consultation with BDN Air Traffic Control has established that RPAS operations in D128 will only affect their radar pattern to Runway 23 and the occasional use of Runway 17/35. The LoA will be amended to reflect the changes necessary and tactical coordination will be agreed as required to minimize delays to all parties.
  - c. Netheravon. This is a military aerodrome at which the Joint Service Parachuting Wing and Army Parachuting Association are based. There is also a Service flying club based at the site. As these activities are provided for Service adventurous training opportunities, the military are responsible for prioritizing and deconflicting all its activities within the Danger Area. An ATZ is established (with a FISO) during published operating hours, which are currently 1700-0100 Mon-Thurs to facilitate night parachuting/flying activities. Subject to funding, the FISO's hours may be extended to include RPAS operations at the aerodrome. The airfield is not open for use by non-based civil aircraft. The site is listed in ENR 5.5 Aerial Sporting and

Recreational Activities, upper limit FL150. All aircraft movements are coordinated through the SPTA Air Operations Cell.

d. Upavon. This is another military site which hosts an RAF Gliding Squadron (622VGS) and the army Wyvern Gliding Club. There are occasional fixed and rotary wing movements by PPR only. There is no ATZ. The site is listed in ENR 5.5 Aerial Sporting and Recreational Activities, active up to 3,000ft. All flying programmes and arrivals/departures are coordinated through STPA Air Ops.

e. Emergency Services. All RPAS activity will be detailed on the SPTA Daily Airspace Allocation Plan. On receipt of any request from an emergency service helicopter to enter the airspace, Air Ops or Range Control will instruct units operating small RPAS to cease flying immediately. Any large RPAS activity will be coordinated through BDN ATC as required. The following instructions are contained within the Letter of Agreement between SPTA Air Ops and the Emergency Services:

(1) Emergency or Priority Flights. Emergency or priority access to SPTA will take priority over routine SPTA operations. Wiltshire Police or Air Ambulance will contact Air Ops by landline or radio stating the nature of the requirement and the access required. No access is to be granted without authorisation from Air Ops which will be granted once the area is sterilised or deconflicted from other users. (NB. An early call to 'Salisbury Operations' will be advantageous as it may take staff several minutes to confirm cessation of hazardous activities). All unmanned air systems (UAS) activity planned on SPTA will be detailed on the Airspace Allocation. On receipt of an area request from an emergency service UAS, Salisbury Operations, or Range Operations when appropriate, will instruct units operating UAS to cease flying immediately if in conflict with the emergency service aircraft.

f. Private Operator. There is one private aircraft operator based within D128 at Fittleton. SPTA has a Letter of Agreement which contains procedures and agreed routing. Due to its location within the Danger Area, the operator's activity is covered by Byelaw SI1965/1327 under the Military Lands Act 1892 and Air Navigation Order Sect Para 74 (3)<sup>1</sup> whereby the operators must adhere to the conditions and procedures described below.

(1) Clearance to fly to/from the site (with an allocated Clearance Number) must be obtained before flying operations commence from SP Air Ops.

(a) During Working Hours: Mon-Thurs 0800-2000 (Local), Fri 0800-1700.

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<sup>1</sup> The Commander of an aircraft flying within airspace notified as a Danger Area shall forthwith comply with instructions given by radio or by the person responsible for safety within the relevant airspace (SP Air Ops).

(b) Weekends and Public Holidays: Contact SP Air Ops by phone before 1200hrs on the last working day prior to the weekend, or holiday period.

(c) SP Air Ops are to be informed of any delay beyond 15 minutes of the clearance provided.

(2) Other known activities and hazards, including any requirement to cease flying operations at the site, will be advised when clearance to fly is given. Updated information on SPTA activity can be sought through the Danger Area Activity Information Service (DAAIS). SPTA Air Ops has no authority over airspace outside SPTA and can pass no information on activities outside SPTA. It is not able to provide any form of Air Traffic Service and clearance to fly does not constitute separation from other aircraft, nor imply that other aircraft will avoid the site.

g. LACC Swanwick. By a Letter of Agreement (LoA), civil aircraft in receipt of a service from LACC (Swanwick) sectors are authorised to penetrate SPTA when Air Ops have notified them as active, by applying 1,000ft vertical separation above the notified activity height.

8. Transit traffic will be accommodated as required, although experience indicates that such traffic invariably routes to the north or east of the airspace. A Danger Area Crossing Service (DACS) is not normally expected nor provided due to the relatively low upper level of the DA (1400ft amsl) and DA activity. For this reason, statistical records are not kept. A DACS is provided at higher levels through adjacent Danger Areas during SPTA Air Operations published opening times and a DAAIS is provided outside of these hours, both on a published frequency and recorded telephone message. This arrangement will be extended to include D128 when notified as active up to FL 80. Further information for pilots can be obtained from BDN who provide a Lower Airspace Radar Service (LARS) during published hours.

9. As a Danger Area listed in the AIPs, pilots should be aware of the potential dangers of entering the area and are to plan their flights accordingly. The prevention of incursions cannot be guaranteed, however existing mitigations are in place with radar coverage by BDN, SSR coverage at SPTA Air Ops and published DACS/DAAIS procedures. All live firing and RPAS operations are ceased immediately if an unknown aircraft is expected to, or has already, entered the Danger Area.

### **Operational Impact**

10. There is no commercial aviation (fare-paying/cargo) activity in the immediate area, therefore this ACP should have no impact on any commercial operators. Western Air at Thruxton already take account of the existing adjacent Danger Areas using published departure and arrival procedures to deconflict traffic with the DAs as required. These procedures should also be followed by visiting GA traffic.

11. The frequency of activation of the airspace above D128 will be by NOTAM and will be for the minimum periods required to achieve the necessary training objectives. This is expected to be as follows and activities may be coincident:

- a. For small RPAS - a maximum upper level of 2500ft, for a total of 8 weeks per year, in periods of 1 week duration.
- b. For large RPAS – a maximum upper level of FL 80, for a total of 8 weeks per year, in 4 periods of 2 weeks duration.

A DACS/DAAIS will be available during these periods. From previous experience, affected GA traffic is expected to be recreational, with seasonal variations. It is, therefore, most likely to peak when military training ceases for the summer leave period. In view of this, the number of aircraft affected is expected to be minimal.

12. All known adjacent airspace users have been consulted where appropriate and the proposed requirements fully discussed. All parties agreed that their operating procedures and requirements would not be adversely affected by BVLOS operations. The dimensions of the Danger Area are not being changed and the published operating times are already H24. D128 will not be activated above FL80 for BVLOS operations. In considering the minor impact to other airspace users, it is suggested that no further formal consultation is required.

### **Economic/Environmental Impact**

13. Both RPAS systems will operate for a maximum of 8 weeks each per annum. Airspace users will be notified by NOTAM in advance. Any requests for GA to enter the NOTAMed Danger Area will be accommodated wherever possible, however the area concerned only measures 6.5 nm x 5 nm, so the worst-case scenario for re-routing an aircraft would require a maximum additional track of approximately 8 nm. Re-routing, if required, is only likely to affect light single-engined aircraft as there are no known commercial operators of multi-engined aircraft in the immediate area.

### **Safety Management**

14. The Safety Argument for SPTA is at Enclosure 1, being written in support of military aircraft operations. All military aircraft flown within the Danger Area are subject to individual platform Safety Management Systems in accordance with MAA regulations. For RPAS, this includes approved mechanisms/software for maintaining flight within allocated areas.

15. Secondary Radar surveillance of the SPTA is presently available to the Air Ops Cell, but primary and secondary radar is proposed for the site from Aug 18. This will provide improved situational awareness for Air Ops staff and allow the continuous monitoring of air traffic. There will be limitations in capturing low level targets due to undulating terrain and the base of radar coverage in the area. In mitigation, all participating aircraft are to squawk and fly iaw the Rules of the Air.

16. In the event of an unknown aircraft entering D128, or any other DA within the training area, any affected aircraft are warned by Air Ops of its proximity and current flight profile. All live firing of ground-based weapons is ceased immediately via direct communications from

Range Control. BDN radar controllers will normally give prior warning to SPTA Air Ops of approaching unknown traffic.

17. When radar surveillance is not available, aircraft are warned of the requirement for extra vigilance. Large RPAS will not be flown if radar surveillance is not available.

18. Small RPAS are flown strictly in accordance with the platform's Release to Service (RTS) authorisation. The platform safety argument can be summarized as follows:

- Full Release to Service (RTS)
- Air System Safety Case (ASSC)
- Fully Regulated by MAA
- Certified training for all operators iaw Defence Systems Approach to Training (DSAT) processes
- Class 1C Categorisation
- Full accountability through a Duty Holder Chain
- Operational risks are Tolerable<sup>2</sup> & ALARP<sup>3</sup>
- System only operates in Special Use Airspace (segregated for military users)
- Adheres to the Layered Safety Approach MAA RA 2320
- Air Safety Management Plan (ASMP)
- ASIMS/DAEMS<sup>4</sup> continuous improvement strategy
- 66,000 Hours flown to date - No airframes have ever gone outside of allocated airspace
- 3 x AIR PROX reported. In all cases, manned aircraft infringed MUAS Restricted Operating Zone (ROZ)
- 10+ Years SQEP experience by professional RPAS staff
- 132,000 flights (@30 min sorties)

19. For small RPAS, the upper level of the area will require additional airspace with an upper level of 2500ft. Small RPAS will be flown within a Restricted Operating Zone (ROZ) which is established within the Danger Area boundaries. This is to provide separation from other activities. The platform will be flown from a ground control station and fly to programmed way-points to ensure adherence to planned flight paths. Any loss of communications will initiate a holding pattern, an immediate 'return to launch point' or immediately terminate the flight. In the event of radar coverage of the area not being available, sentries will be posted as required to alert the operator of any approaching aircraft and the flight will be terminated if necessary.

20. The first generation of large RPAS has been in service with the military for several years, with previous training serials being based at BDN, with a transit route through the

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<sup>2</sup> Tolerable - A level of risk that may be tolerated when it has been demonstrated that the risk is ALARP and is not unacceptable.

<sup>3</sup> ALARP - As Low As Reasonably Practicable. A risk can be said to be reduced to a level that is ALARP when the cost of further reduction is "grossly disproportionate" to the benefits of risk reduction.

<sup>4</sup> ASIMS/DAEMS – Air Safety Information Management System/Defence Aviation Error Management System – These are tools to support the reporting, management and analysis of air safety occurrences, investigations and recommendations. They are open and honest reporting systems which aim to determine the root cause and Contributory Factors of all aviation-related occurrences, recommend intelligent interventions (barriers) and, if necessary, determine culpability.

SPTA Danger Areas en-route to D122A/B/C. Along this route were designated Emergency Recovery Points (ERPs) – see Para 21 for further details. All flights remained within the designated airspace at all times. The pilot (situated in the ground station) will be in receipt of a radar service from a dedicated BDN controller as soon as practicable after departure, who will provide a Basic Service within SPTA and a Deconfliction Service once established within its operating area, D122 A/B/C. The aircraft's low speed affords high manoeuvrability and programmed flight patterns will ensure that the platform remains within the Danger Area boundaries. Any loss of communications will result in the platform automatically going into a holding pattern to re-establish the link or returning to its base following a programmed flight path. The aircraft will only be flown when full radar facilities are available from Boscombe Down and SPTA Air Ops. The loss of surveillance radar during a flight will require the platform to immediately return to base, with vertical separation being applied between known traffic. D128 will only be used for the launch and recovery of the large RPAS to Netheravon. The aircraft will transit through the adjacent Danger Areas of D123 and D125 en-route to D122 A/B/C for its training tasks and return via a reciprocal profile.

21. As a condition of its RTS, the large RPAS requires 6 Emergency Recovery Points (ERPs) across SPTA to which the aircraft can recover in the event of an engine failure, as per the procedure in Para 20 above. Flight beyond the glide range of an ERP is not permitted. This methodology has already been established for previous large RPAS operations over SPTA. The ERPs are all situated within red-flagged Danger Areas which are monitored to ensure that no members of the public or military personnel can enter. They have not been required to date, but will remain mandatory and available for all future flights. The risks to life related to this procedure have been assured through Type Airworthiness assessment and procedural direction of the Delivery Duty Holder and deemed Tolerable; a position which has been 2<sup>nd</sup> party reviewed and endorsed by the Operating Duty Holder.

22. A summary of the Safety Argument is as follows:

- Mk 1 full Release to Service (RTS) 2014+
- Mk 2 will only operate under full Release to Service (RTS) (expected Jun 18)
- Supported by full Air System Safety Case (ASSC)
- Fully regulated by MAA
- DSAT compliant Training (see Para 18)
- Provisional Class 3 Categorisation
- Full accountability through a Duty Holder Chain
- Operational risks are Tolerable and ALARP
- System only operates in Special Use Airspace (segregated for military users)
- Adheres to the Layered Safety Approach MAA RA 2320
- Air Safety Management Plan (ASMP)
- ASIMS/DAEMS continuous improvement strategy
- Army -1073 Hours flown to date (not including supplier's trial flying)
- 340 flights (Sortie duration between 30 mins – 16 hours)
- Nil AIR PROX reported.
- Lost link logics demonstrated successfully
- 10+ Years SQEP experience by professional RPAS staff



## Diagrams, Charts and Documents

23. D128 Everleigh is part of the SPTA Air Danger Area complex as shown in Fig 1 on the 1:500 000 chart below. There is no requirement to change the structural dimensions. The Lat & Long coordinates are 511852N 0014215W - 511621N 0013746W - 511354N 0014225W - thence anti-clockwise by the arc of a circle radius 5 nm centred on 510912N 0014504W to 511351N 0014759W - 511828N 0015004W - 511852N 014215W.

24. The only amendments to AIP documentation will be an addition to the activities and remarks listed in ENR 5.1 under D128. This amendment will be forwarded on Form DAP 1916 to the SARG following a successful outcome of the application as follows:

**Activity:** Live Firing/Para Dropping/Unmanned Aircraft System (VLOS/BVLOS).

**Remarks:** BVLOS operations are not to be conducted above FL80.

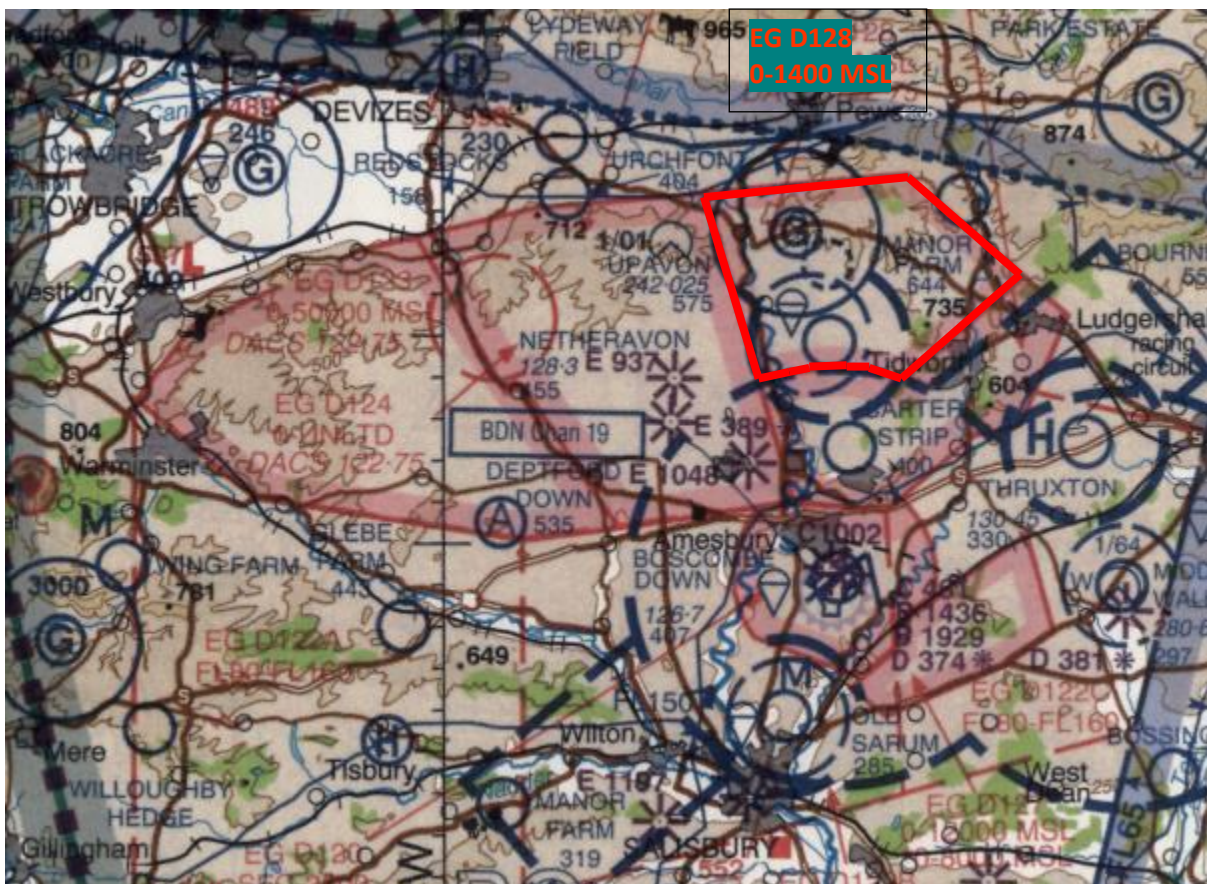


Fig 1

## **Conclusion**

25. It is believed that approval to operate BVLOS RPAS in D128 does not adversely affect nor impose any undue limitations on general aviation traffic in the area. The continued availability of radar will ensure that appropriate de-confliction advice/traffic information can be provided to both the RPAS operators and to transit traffic. In the event of failure of the BDN radar, air sentries will be posted for small RPAS operations and the large RPAS will not be flown at all. The use of air platforms as authorised by the MAA provides suitable mitigation that the air systems are safe to use, are being used safely, and will remain within their allocated airspace.