



Defence
Safety
Authority

Remotely Piloted Air System Manual – Regulatory Process, Categorization, and Compliance

Military Aviation
Authority

Military Aviation Authority
MAA

FOREWORD

1. The purpose of the Remotely Piloted Air System (RPAS) Manual is to provide greater clarity to the RPAS Regulated Community (RC) on the process involved with categorizing RPAS, to simplify their introduction into Service and to provide additional information for more developed RPAS usage and Safety Assurance.

CONTENTS

| | |
|---|----|
| FOREWORD | 2 |
| CONTENTS | 3 |
| SECTION 1 | 5 |
| Introduction | 5 |
| Civilian Aviation Authority (CAA) / MAA Relationship | 5 |
| SECTION 2 – Start Point for Regulated Community | 6 |
| Introduction to Categorization | 6 |
| Selection of Most Suitable RPAS | 6 |
| VLOS Range (derived from CAA AMC1 UAS.OPEN.060(2)(b)) | 9 |
| Registration | 10 |
| RPAS Categorization | 11 |
| SECTION 3 – Responsible People and Training | 19 |
| RPAS RO and RPAS AM / RPAS Senior Operator Change Process | 19 |
| Guidance on Capability Owner | 19 |
| RPAS RO and RPAS AM Briefing Day | 19 |
| Training for operators | 19 |
| SECTION 4 – Open to Specific S2 Pathway and SPCs | 21 |
| Open to Specific S1 Pathway | 21 |
| MAA Approval of move to Specific S1 | 22 |
| Special Purpose Clearances (SPCs) | 22 |
| MAA Authority for SPC Operations (Safe To Operate / Operated Safely) | 23 |
| Interface between Specific S1 and Specific S2 sub-categories | 24 |
| SECTION 5 – Specific S2 to Certification Pathway | 26 |
| Specific S2 sub-category / Certification Category description | 26 |
| Certification | 26 |
| Organizational Approvals | 26 |
| Derogations for Specific S2 sub-category RPAS | 28 |
| SECTION 6 – Occurrence Reporting | 29 |
| Air Safety Information Management System (ASIMS) | 29 |
| Reporting | 29 |
| Feedback | 31 |
| SECTION 7 | 32 |
| Enclosed Space Operations | 32 |
| SECTION 8 | 33 |
| Operational Imperative (Named Operations) | 33 |

Autonomy and Artificial Intelligence..... 33
Swarming..... 34
Armed..... 35
SECTION 9 – References..... 36

SECTION 1

Introduction

3. The proliferation of RPAS within UK Defence continues at pace with the MAA observing greater use of these highly versatile Air Systems across the Defence Air Environment (DAE). The MAA has listened to the request from various elements of the DAE and to support the development of the capability and assist organizations with the introduction of new technology this manual has been written to expand upon the extant Regulation and help the RC to comprehend the detail and commence flying operations as quickly as possible.

4. To enhance operational capability by delivering effective Air Safety Regulation while fostering good practice and appropriate culture across the DAE, the role of the MAA is not to prevent operations from occurring nor stifle innovation, but to ensure that systems are utilized safely and an unintended Risk to Life (RtL) is not introduced, particularly where RPAS are operated in close proximity to conventional crewed aviation. The MAA is the final arbiter in the categorization process for all RPAS, regardless of Category, and will work with the organization requesting categorization to ensure all necessary information is sought to ensure a Letter of Endorsed Categorization (LEC) is rapidly approved.

Civilian Aviation Authority (CAA) / MAA Relationship

5. To ensure that MAA and CAA are aligned in their approach taken to RPAS operations, a joint working group was established to consider issues that affect both the civilian and military RCs, to work together to adopt a joint UK position on RPAS operations and to share information as innovation delivers new RPAS capabilities to operators. This collaboration is intended to deliver comprehensive RPAS policy, Regulation and an approach that has been agreed by both the CAA and MAA and makes clear to the RC within which domain their operation sits.

SECTION 2 – Start Point for Regulated Community

Introduction to Categorization

6. All RPAS operating and intending to operate in the DAE are required to be registered on the UK Military Aircraft Register (MAR) and are required to be categorized based on physical characteristics and operating environment. This is delivered through applying for a LEC from the MAA by submitting a Categorization Submission. Categorization Submissions can be staffed for both conceptual and selected RPAS.

Selection of Most Suitable RPAS

7. RPAS have many different uses within the DAE and come in a variety of designs that favour different types of operations. Prior to procurement, it is recommended that the user research the market to identify available RPAS that would best achieve the desired effect and are designed to appropriate design standards. The RPAS network can be consulted to see whether any suitable RPAS are already in service with the military. Use of these RPAS can significantly reduce the administrative burden of achieving security and regulatory compliance. Engagement with the Mini RPAS Type Airworthiness Authority (TAA) at the Defence Equipment and Support organization (DE&S) to identify RPAS manufacturers on the Endorsed Manufacturers List (EML) is also recommended¹. Particular attention will be paid to ensuring that RPAS do not fall foul of potential security violations. Discussion with units operating in a similar context is recommended to identify systems which are / are not the most appropriate for intended use. Some of the designs available to the RC are as follows (not to scale):

Multi-rotor copter: This type has more than one power-driven rotor, most commonly four (Quad-copter), all providing lift. It takes off, lands, flies, and hovers like a traditional 'single rotor' helicopter.

(PARROT ANAFI)



Single-Rotor Helicopter: This type has one power-driven rotor and looks a bit like a traditional helicopter.

(BLACK HORNET NANO-RPAS)



¹ The EML detailed manufacturers of RPAS within the Open A2, Open A3, and Specific S1 sub-categories only.

Fixed Wing: This type looks and flies like a regular aeroplane - it has fixed wings. It also takes off and lands horizontally.

(PARROT DISCO)



Fixed Wing Vertical Take-Off and Landing (VTOL): This type can take off and land vertically (straight up and down) like a helicopter, but can then move into forward flight delivering lift from its wings like a traditional aeroplane.

(KYBOSH VTOL RPAS)

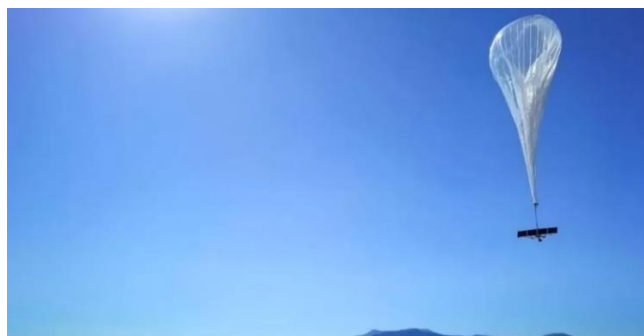


Airship: This type is engine powered and is 'lighter than air' – it is filled with a buoyant gas and 'floats' in the air with or without the use of ballonet or ballast to maintain its altitude equilibrium.

(AIRSHIP GA22)



Balloon: People often disregard an uncrewed balloon as a type of RPAS, however directional control of the balloon can be achieved by precise altitude control inputs to the balloon remotely.



8. Regardless of size, all RPAS owned and operated by a UK defence organization must be categorized by the MAA before they can be operated. To ensure proportionate Regulation, the MAA operates a Risk-based approach to RPAS categorization that depends on the physical characteristics and operational intent. These two factors decide the most appropriate operating category based on the RtL posed to uninvolved persons on the ground and crewed Aircraft in the air. It is important to note that because categorization is based not just on the RPAS characteristics, but also on how and where it will be operated, RPAS categorization can result in two units with identical RPAS operating in different categories.

9. RPAS Regulation is contained within the 1600 series of Regulatory Articles (RA). For the Open and S1 sub-categories, the Regulations are designed for use by units that do not specialize in aviation. Operators in the Open and Specific S1 sub-categories need only comply with RA 1600 and the specific RA for the category of operation (RA 1601 – 1604), and the documents they reference. Wherever possible, the MAA has sought to limit reference to other RAs to make it easier for Open / S1 operators to comply with the RAs. RPAS operating in the Certified category are required to comply with the full MAA Regulatory Publications (MRP). RPAS operating in the Specific S2 are required to comply with the full MRP less those RAs for which derogation is sought during the LEC application and agreed by the MAA (see the derogations later in this manual for examples).

10. The relevant RAs for RPAS Operations are as follows:

- a. **RA 1600.** This is the overarching document that covers Military registered RPAS operations and is the start point for units planning to conduct RPAS operations.
- b. **RA 1601: Open A1, Sub 250 g.** Operated within Visual Line of Sight (VLOS). Allows operations over uninvolved people but not over assemblies of more than 1,000 people.
- c. **RA 1602: Open A2, Sub 4 kg.** Operated within VLOS. Capable of being operated safely, but no closer than 30 m from uninvolved people. Operation to within 5 m is possible when the RPAS is equipped with a slow speed mode and it is selected by the Remote Pilot (RP).
- d. **RA 1603: Open A3, Sub 25 kg.** Operated within VLOS. Allows for operations to a minimum horizontal distance of 50 m from uninvolved persons but not within 50 m of Congested Areas.
- e. **RA 1604: Specific S1, Sub 25 kg.** Operated Beyond VLOS (BVLOS) up to 2 km. Is flown inside the UK Flight Information Region and in Segregated Airspace.
- f. **RA 1605: Specific S2, All weights.** Operated BVLOS in excess of 2 km. Have a Maximum Take-Off Weight (MTOW) of 25 kg or greater.
- g. **RA 1606: Certified, All weights.** Operations that present a greater potential RtL than that of the Specific Category and present an equivalent 2nd and 3rd party RtL to that of crewed aviation. Other criteria include:
 - (1) Flight over areas of high population density;
 - (2) Carriage of people;
 - (3) A determination by the MAA that residual RtL is too great unless the RPAS is certified, based on a combination of: MTOW, Remotely Piloted Aircraft (RPA) size, VLOS or BVLOS operation, overflight of people, airspace integration and classification, Detect And Avoid, etc, or;
 - (4) Automatic or autonomous systems with procedures that prevent the RP from directly controlling the RPA throughout the entirety of its flight (except for unplanned emergency conditions such as lost link profiles).

Figure 1: Safety and Certification of Uncrewed Air Systems - Scientific Figure on ResearchGate²

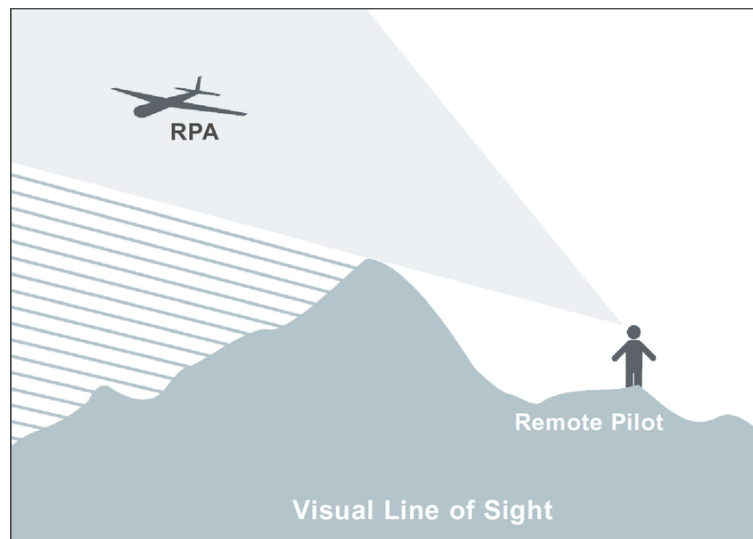
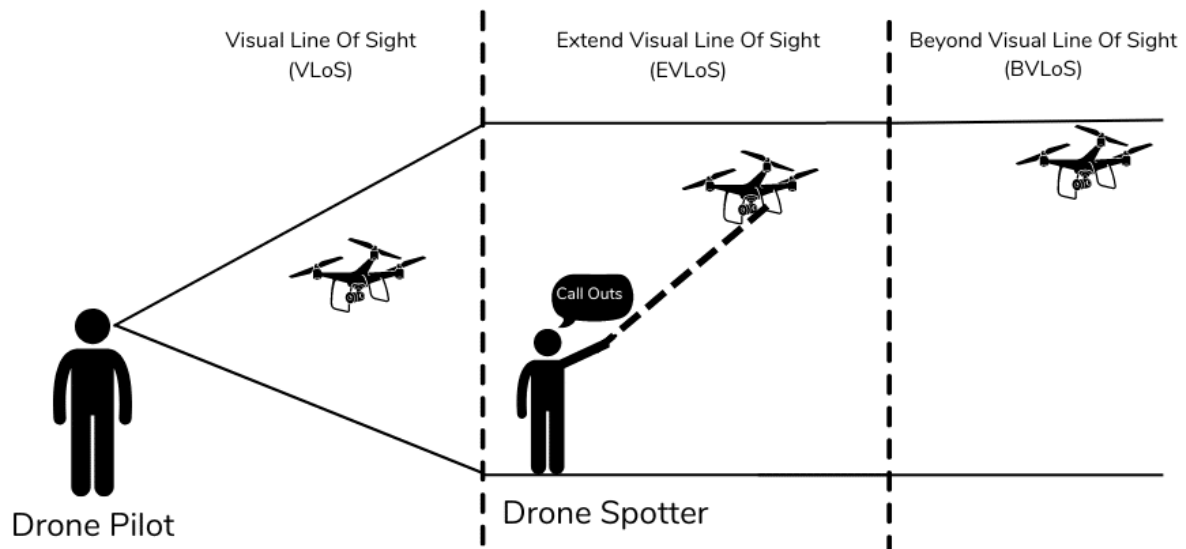


Figure 2: Drone VLOS, EVLOS, and BVLOS terms explained



VLOS Range (derived from CAA AMC1 UAS.OPEN.060(2)(b))

11. The maximum distance of the RPA from the RP will depend on the size of the RPA and on the environmental characteristics of the area (such as the visibility, presence of tall obstacles, etc).

12. RPs must keep the RPA at a distance such that they can maintain continuous unaided visual contact with it, allowing the RP to determine the orientation of the RPA so that they can control its flight path in relation to other Aircraft, people and obstacles for the purpose of avoiding collisions.

13. If the operation of the RPA takes place in an area where there are no obstacles, and the RP has unobstructed visibility up to the horizon, the RPA can be flown up to a distance such that the RPA remains clearly visible, but no further than 500 m, in order that it can be controlled, this includes being able to determine the RPA's orientation.

² Available from: https://www.researchgate.net/figure/1-Visual-line-of-sight_fig1_276472189.

14. If there are obstacles in the operating area, then the distance the RPA can be flown away from the RP will be reduced such that the RP is able to evaluate the relative distance of the RPA from those obstacles.

15. The RP will also consider other factors that may affect the maximum range of the RPA from the RP, including the effective range of the C2 link.

Registration

16. Registration of an RPAS, and its associated registration marking, is required to provide each RPAS with a unique identity. To operate within the DAE military registration is required, and registration markings must be displayed. These RPAS will be registered in the UK MAR.

17. The RPAS will not be eligible / suitable for registration by the CAA; that is, it is a military Aircraft for the purposes of the UK Air Navigation Order (ANO)³, it is required to be operated in a manner outside that permitted by the ANO, or the operation or design is outside CAA expertise.

18. **Embarked RPAS Operations.** RPAS to be operated from HM / MOD Ships need to be registered in the UK MAR or civilian registered under contract to the MOD⁴. RPAS operations, other than those conducted in the Open A1 category, need to be authorized through an appropriate Ship Air release (SA-Release) process. For Open A2 and A3, and Specific S1 Category operations, the RN Delegated Release to Service Authority (DRTSA) will determine the extent of the process for SA-Release based on a preliminary Risk Assessment conducted by the Ship SH and the RPAS RO. For RPAS in the Specific S2 and Certified categories, a full SA-Release is required in accordance with (iaw) RA 1395(2). Those responsible for embarked RPAS operations are advised to consult RAs RA 1029, RA 1395, and RA 1920 for details of the SA-Release processes and responsibilities.

19. RPAS operating in the Open or Specific S1 sub-category will not be registered as individual Air Systems; instead the Air System Type will be given a one-off Military Aircraft Registration Number. For these RPAS, the RPAS Responsible Officer (RPAS RO) / RPAS Accountable Manager (RPAS AM) / RPAS Flight Operations Post Holder (RPAS FOPH) will maintain a record of individual Air Systems identified by a unique serial number (identifying both the operator and the airframe); and will ensure that both the Type Military Aircraft Registration Number and the unique Air Systems serial number are displayed on the main fuselage.

20. RPAS operating in the Specific S2 sub-category could be registered by either Type or Tail iaw RA 1161. It is incumbent on the Applicant for the LEC to propose which is most appropriate, providing an argument based on the characteristics, proposed use and regulatory framework of the particular RPAS. If by Type, the Duty Holder (DH) will maintain a local record of individual Air Systems identified by a unique serial number, as per paragraph 19.

21. RPAS operating in the Certified Category will be registered as individual Air Systems. RA 1161 requires that when applying to register an RPA on to the UK MAR an Application for Approval in Principle (AAiP) will be submitted.

22. Specific S1 and Open Category RPAS do not require an AAiP and the application for categorization will serve as the application for activation on the UK MAR.

³ A military Aircraft is defined as; the naval, military or air force Aircraft of any country; any Aircraft being constructed for the naval, military or air force of any country under a contract entered into by the Secretary of State (SofS); and any Aircraft for which there is in force a certificate issued by the SofS that the Aircraft is to be treated for the purposes of this Order as a military Aircraft. Refer to ANO Schedule 1.

⁴ ICAO requires non-state Aircraft that operate over the high seas (> 12 nm from the coast) to have been issued and carry a certificate of Airworthiness iaw Chicago Convention Article 29. Currently this applies equally to RPAS so Open and Specific operations by non-state RPAS are not permitted.

23. For RPAS that are planned to operate in the Specific S2 sub-category, the RPAS Categorization Submission constitutes the AAiP: the application for categorization must include the details required by RA 1161 para 29. The application for categorization must be accompanied by either an Air System Safety Case Report (ASSC-R) that sets out the claims, argument and the proposed evidence to be generated to demonstrate that the RPAS operations will be As Low As Reasonably Practicable (ALARP) and Tolerable. Alternatively, the applicant may include details of how the Operational Safety Objectives will be met for the proposed Safety and Integrity Level⁵.

24. For RPAS that are intended to operate in the Certified category, the MAA recommends that the SRO submit the AAiP at least 6 months prior to when activation on the MAR is required. It is advisable for the SRO to approach the MAA to discuss the requirements for registration of new certified RPAS as early as possible.

25. The ANO requires that the military status of Civilian-Owned RPAS that intend to operate, or are operating, in the DAE in the Specific S2 sub-category or Certified category are recognized by the issue of a Certificate of Usage (CofU)⁶ signed on behalf of the Secretary of State for Defence. This will normally be signed by the 2 Star Crown Servant who is acting as the sponsor of the civilian-owned RPAS⁷. The applicant is required to submit the CofU as part of the AAiP.

26. Specific S2 sub-category and Certified Category require the ASSC-R, or evidence to demonstrate that the Operational Safety Objectives (OSO) are met, to be submitted to the MAA for review prior to final activation of the RPAS on the MAR. For S2 RPAS where the RtL is assessed to be higher and the mitigations are more reliant on technical assurance, the MAA may require the Release To Service (RTS) Recommendations (RTSR) or Military Permit To Fly (MPTF) (In-Service) Recommendation (MPTF (IS)-R) to be submitted for assurance prior to activation.

RPAS Categorization

27. RPAS operations pose a Risk to personnel on the ground and to other Air Systems in the air. Regulation is designed to reduce this Risk to an acceptable level whilst being proportionate to the Risk posed by the RPAS. This Risk is a function of both the physical properties of the RPAS (size, mass, and speed) and the manner in which it will be operated (population density of the ground over which it will operate, airspace, time of day, aircrew training etc). The process of categorization is designed to ensure that the regulatory framework for the proposed RPAS operation is proportionate and will ensure that an RPAS is safe to operate and is being operated safely.

28. Note that for all but the smallest RPAS (ie those operated in the Open A1 Category), the Risk of collision with RPs, involved or uninvolved personnel, or crewed Aircraft is NOT acceptable. Therefore, the duty on the RPAS RO operating in the Open or Specific S1 sub-categories is to ensure that operations are conducted in such a way that the likelihood of this occurring is improbable⁸. If the RO has any concerns that an RPAS might impact any person or crewed Aircraft then they will cease the activity.

29. It is important to note that for Specific S2 and Certified Categories, the LEC acts solely as the confirmation of Category and MRP governance framework. For S1 and Open Categories, it additionally takes the place of the ASSC and RTS submissions and acts more like an operational authorization in civil terminology; RA 1600 Annex B provides the criterion for Specific S1 and Open Categorization Submissions.

⁵ See section re SORA at Annex B.

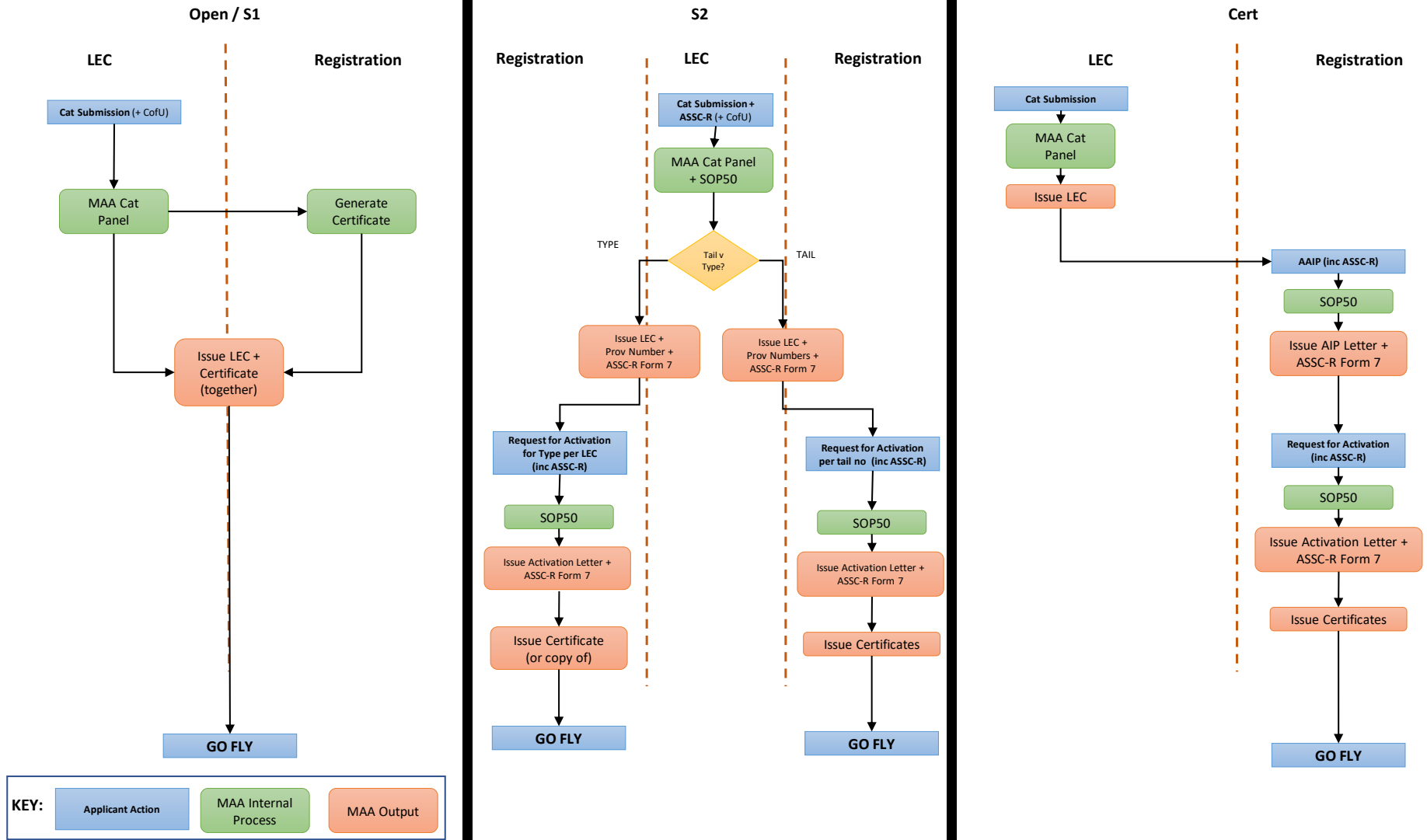
⁶ Refer to RA 1160(3): Certificate of Usage.

⁷ Refer to RA 1019 – Sponsor of Military Registered Civilian-Owned and Civilian Operated Air Systems - Air Safety Responsibilities.

⁸ Unlikely to occur in 10 years.

30. Annex A provides guidance to consider across the Safe to Operate and Operate Safely areas when compiling a Categorization Submission.
31. A pictorial illustration of the application process, required inputs, necessary stakeholders and outputs is enclosed at Figure 3.

Figure 3: RA 1161 vs RPAS LEC flow



32. Organizations planning to procure RPAS with an intended categorization of Open and Specific S1 sub-categories are unlikely to use the formal defence procurement process. It is strongly recommended that those authorizing the procurement consider the intended category of operation carefully. If there is any aspiration to operate in the Specific S2 or Certified categories, it is recommended that an assessment is made as to whether there will be sufficient evidence to assure those operations. The same consideration applies when acquiring RPAS to operate in the S2 category. For example, if an RPAS were procured to move materiel, with an aspiration to expand its use case to include casevac, those making the decision will consider whether the manufacturer will be able to provide the artefacts required to support certification.

33. For Open and S1, it will be the organization which plans to operate the RPAS that will be responsible for submitting the case for categorization to the MAA. It is advisable for the case to be supported by all key stakeholders since categorization applied to an RPAS may impose a regulatory restriction that limits operational use or impacts upon overall project cost.

34. For S2 and Certified, it will normally be the TAA who is responsible for submitting the case for categorization to the MAA. It is essential that the case is supported by all key stakeholders, especially the nominated Aviation Duty Holders (ADH) / Accountable Manager (Military Flying) (AM(MF)) since categorization applied to an RPAS may impose a regulatory restriction that limits operational use or impacts upon overall project cost.

35. Key stakeholders have been listed within the RA 1600 Series; however, organizations may also wish to consider engagement with the appropriate RTS Authority if they are applying for the Specific S2 or Certified categories. Further, the applicant would wish to consult with the Royal Navy Deputy Release To Service Authority on any requirements for Ship Air Release.

36. MOD owned and / or operated RPAS will need "authority to proceed" and to comply with 2023DIN03-017. Applicants are recommended to consider consultation with the Defence RPAS Network and the DE&S RPAS Delivery Team (DT) TAAs regarding the suitability of their system for either Open or S1 tasks prior to seeking categorization from the MAA.

37. **Secure by Design.** Secure by Design (SbD) is a recent MOD policy which mandates personnel involved in the definition, Acquisition, development, Maintenance, and disposal of information-based capabilities for the MOD to ensure SbD is adopted throughout the capability lifecycle. This includes but is not limited to networks, applications, services, information technology, operational technology, platforms and weapons Systems. From July 2023 SbD replaces the current accreditation approach: projects that had already commenced prior to this date can refer to 2023DIN02-017⁹ for further information.

38. SbD will ensure that cyber security is taken into consideration from the outset of a project with the aim of identifying and managing cyber security Risks efficiently from the very start. This policy requires Senior Responsible Owners to be accountable for cyber security Risks alongside any other Risks managed by their programmes. Please refer to JSP 440, Leaflet 5C for details.

39. **Cyber Security for Airworthiness.** The MAA published two Cyber Security for Airworthiness (CSA) RAs¹⁰, placing requirements on ADHs, Accountable Managers (AM), Senior Responsible Owners and TAAs, to ensure cyber security threats to Air Safety and

⁹ Refer to 2023DIN02-017 Cyber Defence and Risk – Secure by Design (Published; 19/07/2023).

¹⁰ Refer to RA 1202 – Cyber Security for Airworthiness and Air Safety and RA 5890 – Cyber Security for Airworthiness and Air Safety – Type Design and Changes / Repairs to Type Design.

Airworthiness are identified, suitably mitigated, and managed throughout the life of the platform accordingly.

40. The RAs include a requirement to conduct CSA analysis on Air Systems already on, or destined for, the UK MAR. The MAA granted some latitude in order to achieve compliance with the RAs which is detailed in the corresponding Regulatory Instruction (RI)¹¹.

41. **Endorsed Manufacturers List.** The RPAS DT maintains an EML for manufacturers of RPAS likely to be categorized within the Open A2, Open A3, or Specific S1 sub-categories. Inclusion on the EML is gained following a satisfactory Quality and Safety Management Systems assessment conducted by the RPAS DT to provide a basic level of Assurance of the competence of the manufacturer. It is important to note that the speed of innovation in the RPAS world means it is impossible for the EML to contain all RPAS types that may be developed by the manufacturers on the EML.

42. The EML provides technical Assurance that an RPAS manufacturer has sufficient planned and systemic design and manufacturing procedures that are reviewed and evaluated that make it probable to produce a consistent standard of product against a specification. This includes: clearly defined roles and responsibilities, Suitably Qualified and Experienced Person (SQEP) in key roles, independent checks of design and manufacturing, a Quality Management System, a Safety Management System, clear documentation and processes, sufficient resource and facilities for the scope of work, design processes for new RPAS and undertaking changes to existing RPAS and their flow through to the document set, process for investigating malfunctions / Occurrences.

43. It is best practice to procure a platform from a manufacturer endorsed on the EML. It is acceptable to procure an RPAS from a manufacturer that is not included on the EML. Those wishing to do so are advised to approach the DE&S RPAS DT to request an assessment of the manufacturer to support their request for categorization. Where an assessment is not possible, the applicant must provide evidence that the RPAS being acquired has a European Union (EU) / UK conformity marking or is designed to similar standards and that the manufacturer has satisfactory Quality and Safety Management Systems. In both cases a full RA 1600 Annex B Appendix 1 submission will be made to the MAA for review.

44. **Categorization Submission contents.** The categorization needs to provide sufficient information to demonstrate that the RPAS is safe to operate and can be operated safely in the proposed category. Applicants will provide sufficient detail and, where required, evidence to enable the MAA to make a determination. If there is any doubt as to what is required, the applicant is encouraged to request advice from the MAA at the earliest opportunity.

45. **Applications for Open and Specific S1.** Those applying to operate in the Open or Specific S1 sub-categories will complete their application using the template at Annex B to RA 1600. Where a standard set of orders are used to control the operation of RPAS¹², these can be submitted, and the headings covered by the orders need not be completed separately in the application.

46. **Applications for Specific S2 and Certified.** The application for categorization for Specific S2 and Certified will normally be submitted by the nominated TAA and will be endorsed by the proposed ADH / AM(MF). Where no TAA is available, an operator may submit the application which will detail how they plan to deliver the Type assurance responsibilities normally discharged by the TAA. It is unlikely that the MAA would waive the requirement for a TAA for RPAS operations assessed to be in the Certified category. The application will cover the following as a minimum:

¹¹ Refer to MAA/RI/2023/03 – Cyber Security for Airworthiness and Air Safety.

¹² Eg Army UAS Group Orders for Open and S1 sUAS Operations.

- a. A technical description of the RPAS. This assists the MAA in understanding the category to which the RPAS will be assigned, particularly with a new or less familiar system.
 - b. A description of the organization's operating intent. How do you want to utilize the RPAS? What is the effect that you are looking to achieve? How will you operate it safely? Where do you intend to operate it?
 - c. A statement of proposed categorization and the aggravating and / or mitigating factors affecting the RPAS categorization.
 - d. A statement of which MRP documents are deemed to be applicable to the proposed categorization and the method of compliance.
 - e. An outline Airworthiness Strategy. For small RPAS operating at relatively short BVLOS ranges (2 – 10 km), this can be fairly straight forward, for a more complex design falling into the S2 and Certified then this will be comprehensive and have to satisfy a number of significant elements.
 - f. A proposed Design Safety Target.
 - g. Key stakeholders details (eg RPAS RO / RPAS AM / RPAS FOPH / ADH / Accountable Manager (Military Flying) (AM(MF)), TAA, etc).
 - h. A statement that all documentation has been verified by the applicant.
47. The case for categorization will consider the characteristics of the RPAS in its operating context, and thus the submission will be co-ordinated with all identified stakeholders.
48. The applicant may seek Alternative Acceptable Means of Compliance (AAMCs), Waivers or Exemptions (AWE)¹³ against some of the requirements of the MRP. The case for these can be made in the application and, if the MAA accepts them, the LEC will include these as part of the regulatory framework within which the RPAS will be operated. Separate AWE applications are not required. The case for categorization only needs to consider MRP AWEs that are applicable against the proposed RPAS Category.
49. It is in the best interests of the applicant to include as much available detail as possible to aid decision-making. Any enquiries regarding the Categorization Submission can be directed to the MAA at DSA-MAA-MRPEnquiries@mod.gov.uk.
50. When complete the case for categorization will be sent to the MAA at DSA-MAA-MRPEnquiries@mod.gov.uk.
51. **MAA Action on receipt of Categorization Submission.** On receipt of a Categorization Submission, the MAA aims to provide a response within 30 working days, but early engagement on details and timelines will assist in facilitating particular requests. This timeline is paused if additional information be requested. The response could be issuance of an LEC or a rejection of the activity in its current framework. The MAA may categorize the RPAS into a different Category than requested.
52. For Open and Specific S1 sub-category RPAS, operations can commence as soon as categorization is approved by the MAA.
53. For S2 and Certified Category RPAS, the initial application for categorization will seek agreement for an Airworthiness Strategy to provide an acceptable level of technical Assurance. Thereafter those categorized as Certified will follow the standard processes for certification¹⁴. For S2 RPAS, the MAA may require the TAA to submit the technical evidence used to underpin the Type Airworthiness Safety Assessment (TASA), the RTSRs or MPTF

¹³ Refer to MAA03: MAA Regulatory Processes.

¹⁴ Refer to RA 5810 – Military Type Certificate (MRP Part 21 Subpart B).

(IS)-R for scrutiny and review along with actions identified in the LEC. The MAA is also likely to require the ASSC-R to be submitted for scrutiny prior to agreeing to activate the RPAS on the MAR. Only once the platform has been activated on the MAR can flying operations commence. Details of what is required will be determined during the categorization process and included in the LEC.

54. Early engagement with the MAA is encouraged:
- a. The Categorization Submission will ideally be made as early as possible in any RPAS Acquisition process to ensure that the correct certification and regulatory regime can be adopted.
 - b. For RPAS being acquired through DE&S, engagement will ideally be prior to Outline Business Case, and certainly no later than Full Business Case.
 - c. For RPAS being acquired outside of DE&S, Future Capability Group or the RPAS DT can assist in understanding the process for this.
55. The Defence RPAS Network Teams Site provides useful guidance on compiling Categorization Submissions.
56. The LEC will detail confirmation of the RPAS Category and or sub-categories detailing the Regulatory Framework to be applied and, for S2 RPAS, details of any documentation that needs to be submitted for scrutiny and review prior to activation on the MAR.
57. It is expected that dialogue will take place between the MAA and the submitting organization during the submission process.
58. **Validity of the LEC.** Unless otherwise stated, the LEC will remain valid provided the conditions specified in the LEC remain valid. It is important to note that the LEC is not solely tied to the platform, but rather the platform *and* the organization's intended usage and context of use. As such, multiple LECs could theoretically exist for a single RPAS type if multiple organizations intend to operate the platform in different contexts. The MAA will review the LEC 2-years after Initial Issue Date to check for continued requirements and to ensure all details are still valid; ie the Organizational Structure has not changed.
59. **Changes to the Conditions Specified in the LEC.** If changes to the equipment, operating context / use or environment of the RPAS are proposed, which fall outside the conditions specified in the LEC, the head of the organization responsible for the RPAS – or the TAA for Specific S2 and Certified categories – must submit a case to the MAA for reassessment of the category. The following points are important to note:
- a. Resubmission could result in a re-categorization of the RPAS which may require additional MRP compliance (including certification).
 - b. It is highly recommended that when a system is being procured, that the future aspirations for use of the platform are articulated within the Categorization Submission, which may lead to eventual operation in a different Category (ie armed operations or carriage of people). It may be possible to categorize initially into a lower Category, but the additional activity that will be required to achieve the longer-term use aspirations within the life of the Aircraft will be detailed. This allows the MAA confidence that appropriate Assurance for the higher Category will be achieved. The final use case will dictate required design standards at inception to allow appropriate contracting.
 - c. For changes in use or organization in Specific S2 and Certified categories, the ASSC Report needs to be resubmitted to the MAA for review.

MAA Action

60. **Initial Action.** On receipt of the application for categorization the MAA will allocate an RPAS categorization reference number and will send an email to the applicant confirming receipt and informing them of the unique reference number.

61. **Management of the RPAS Categorization Submission within the MAA.** The MAA will form an RPAS Categorization Panel (with an appointed Authorizing Officer) to review the Categorization Submission and a lead Desk Officer will be appointed to co-ordinate activity. Ideally the Panel and Authorizing Officer will be the same for both the provisional and full categorization application. It is expected that the MAA categorization process, from receipt of the Categorization Submission to issuing a LEC or provisional categorization response, will take no longer than 30 working days. If the MAA requires further information from the submitting organization, the 30 working day countdown will be paused until the information is received and the categorization process is able to resume. If it is likely that the 30 working day timescale will not be met, the applicant will be informed and regularly updated until the LEC or provisional categorization response is issued. If there is an operational requirement for a unit to achieve categorization quicker than these timescales, then this will be discussed with the MAA and the application can be prioritized.

62. **MAA LEC.** The categorization will be endorsed by the Authorizing Officer. The LEC will be issued to the applicant (copied to all key stakeholders) which will specify:

- a. The RPAS Type.
- b. The categorization.
- c. The Design Safety Target (if applicable).
- d. Any operating conditions / limitations.
- e. The applicable Type Certification requirements.
- f. The applicable Regulatory Baseline.
- g. A unique identifying reference.
- h. The title, name and signature of the MAA Authorizing Officer.
- i. The Organizational Construct; RPAS RO / RPAS AM / RPAS FOPH / ADH / AM(MF), TAA, Capability Owner, Senior Operator, etc.
- j. List of all categorized RPAS with associated sub-categories.
- k. AWEs and Special Purpose Clearances (where relevant).

63. **Provisional Categorization.** Note that when a case for categorization is made during an RPAS concept phase, the MAA RPAS Categorization Panel may issue a Letter of Provisional Categorization as a result of only limited or unverified information being available. Such RPAS will still need to be formally categorized prior to operation and, therefore, organizations will be required to submit a further and more comprehensive case for categorization.

SECTION 3 – Responsible People and Training

RPAS RO and RPAS AM / RPAS Senior Operator Change Process

64. For changes in RPAS RO where the new RPAS RO is content with the extant RA 1600 Annex B submission and organizational Standard Operating Procedures (SOP's), then a simple LEC amendment is sufficient, assuming that the new RPAS RO has attended the RPAS RO and RPAS AM Briefing Day. If the new RPAS RO of the organization is making changes to the Appendix B, organizational construct or SOP's, then a full re-submission is required for consideration by the MAA.

Guidance on Capability Owner

65. The Capability Owner sits in the Certificate of Conformity above the RPAS RO and RPAS AM. The role holder will hold the rank of OF5 (or equivalent). The responsibilities of the Capability Owner are deliberately permissive within the Regulation as the role will differ from one organization to another. There will be some organizations where the Capability Owner will be very involved in RPAS operations and other organizations where they may have little involvement. The key is that the Capability Owner is aware of the RPAS operations within their organization. It is the responsibility of the organization to define how their Capability Owner fits within their DH construct depending on the nuances of the organization operational construct.

RPAS RO and RPAS AM Briefing Day

66. All RPAS ROs and RPAS AMs in the Open A2, Open A3, and Specific S1 sub-categories are required to attend the RPAS RO and RPAS AM Briefing Day which is delivered virtually by the MAA's RPAS Team and is held multiple times per year. The following subjects are covered:

- a. Risk posed by RPAS.
- b. Legal and DH Construct.
- c. Relevant RPAS Regulations.
- d. RPAS innovation and future development.
- e. Categorization.
- f. Safety Culture.
- g. Risk Management.

67. Attendance in the RPAS RO and RPAS AM Briefing Day is compulsory for all those assuming responsibility for delivery of RPAS operations and on completion their details will be recorded on the MAA Briefing Master Register. There are some circumstances where individuals will have been an ADH and on a case-by-case basis the need to attend the RPAS RO and RPAS AM Briefing Day will be considered. However, waivers against this requirement are unlikely due to the fundamentally different way in which Open and Specific S1 RPAS are regulated when compared to crewed Aircraft. RPAS ROs and RPAS AMs can delegate supervisory day-to-day operating responsibilities to a SQEP (minimum OF3) within their Area of Responsibility (AoR). These individuals will attend the RPAS RO and RPAS AM Briefing Day prior to assuming their delegated responsibilities. Senior Operators and other non-Duty Holding personnel are welcome to attend upon agreement with the MAA.

Training for operators

68. The training of RPs can be achieved through various means, and this is not solely limited to Military Training Establishments but also RPAS Recognized Assessment Entities (RAE) which are regulated by the CAA.

69. **The General “Visual Line of Sight” Certificate (GVC).** The MAA has recognized the need for additional training opportunities due to the volume of prospective RPs. The GVC is the drone training and qualification required to apply for Operational Authorization within the CAA. The Civilian GVC qualification provides a viable training pipeline for RPs. It is to be noted however that training of the GVC will be towards CAA Civil Air Publication (CAP) 722 Regulations, so on completion Military RPs will need to receive additional training to ensure that they understand their responsibilities iaw the MRP. Those that will be required to conduct BVLOS operations will complete BVLOS practical flying training under the supervision of an RPI / RPAS SO until deemed qualified as competent to operate BVLOS.

70. **Recognized Assessment Entities (RAE)¹⁵.** There are numerous RPAS training establishments available to the RC. Units are advised to exercise caution when selecting one to train their RPs and ensure that they have the required CAA authorization to be able to deliver training that will legally allow a pilot to operate under a GVC.

71. **Military Training Establishments.** There are several Military organizations that are recognized by the MAA as providing Defence System Approach to Training (DSAT) compliant training to Military RPs (eg RN’s 700X NAS, RAF Force Protection Centre).

¹⁵ The list of CAA approved RAEs is found in the [Unmanned Aircraft section](#) of the CAA website.

SECTION 4 – Open to Specific S2 Pathway and SPCs

Open to Specific S1 Pathway

72. The responsibility for maintaining the Risk of ground and air collision to an acceptable level rests with the RPAS operator. These Risks can be managed quite easily when operating VLOS, although training is essential to ensure that RPs and observers are alert to the Risks and take the appropriate action, quickly and effectively, when crewed Aircraft of non-involved persons enter their area of operations.

73. For BVLOS operations, the responsibility for ensuring that the RPAS does not collide with crewed Aircraft remains with the RPAS operator. Both the MAA and civil authorities regulate on the assumption that any collision between an RPAS and an Aircraft will result in loss of control of both Air Systems. Pilots of crewed Aircraft are unlikely to see small or medium-sized RPAS until it is too late, therefore RPAS operators must have robust processes in place to minimize this Risk. All BVLOS RPAS operations must be conducted in segregated airspace unless they are equipped with an approved detect and avoid capability. Segregated airspace is defined as airspace of specified dimensions that has been allocated for the exclusive use of the RPAS.

74. In most cases, the RP will identify other airspace users before they identify the RPAS, and therefore the RP will usually be first to manoeuvre away from any conflicting Aircraft. Therefore, the RPAS operator is responsible for maintaining separation from crewed Aircraft and must take precautionary measures to avoid affecting the Safety of other airspace users. ROs must also consider taking measures to enhance the conspicuity of their RPAS wherever practicable. For VLOS operations, this duty can be met by maintaining continuous unaided visual contact with the RPA allowing the RP to manoeuvre it to avoid other Aircraft, people, or obstacles to prevent collisions.

Experience

75. Most Open category LEC holders will have the necessary SQEP to grow their organization into an S1 organization. An S1 LEC will allow operations BVLOS out to a maximum range of 2 km. 2 km was determined the limit due to the range at which most Aircraft engine / rotor noise can be detected to alert RPs to take avoiding action.

76. BVLOS operations require extra thought and care with regards to maintaining the situational awareness of other potential air users. When operating BVLOS it is important to have procedures in place to ensure that any Aircraft entering the RPAS operational area can be detected and that information can be conveyed in a timely fashion to the RP to allow for avoiding action to mitigate the chance of a Mid-Air Collision (MAC). The RPAS RO / RPAS AM has a legal duty to minimize the Risks posed by their RPAS operations. There is no relief from this obligation when conducting training. On operations, the commander may take additional Risk if they can justify that this is necessary to achieve their military objectives. It is strongly recommended that a local log of operational decisions and their rationale is retained at the appropriate classification level for a suitable period as an Audit trail in case of Incident.

77. The majority of Specific S1 organizations' submissions choose to maintain their situational awareness when operating BVLOS through the use of air observers who maintain an "eyes out" approach scanning for any incoming traffic. These observers have a means of rapid communication to the RP. It is important to note that whilst this is the most common method, it is not the only method that could be used to maintain situational awareness. The MAA acknowledges that units will wish to train as they fight and the positioning of air observers is not a realistic tactical approach, as it is unlikely observers would be placed in vulnerable positions on operations. However, for UK and overseas training it is essential to have an effective means of detecting Aircraft entering the operating area and observers provide a very good mitigation from MAC with non-cooperative traffic. Whatever the selected

methodology, the RPAS operator must ensure that the Risk of MAC is acceptable. Practically, this means that if there is any doubt that safe separation can be maintained, RPAS operations must cease.

78. **SQEP for Specific S1 Operations.** BVLOS operations require a higher level of operator competency, this is why the MAA does not issue S1 privileges to a new RPAS organization. There will be a period of demonstration of safe operation in the Open category. The MAA is often asked what level of SQEP is required for migration to S1 one. Typically the MAA would like to see evidence of 100 hours of Drone operations and that the organization has held an LEC for a minimum of 3 months. It can therefore be seen that an organization with a high level of flying will be able to move to S1 at a greater rate than an organization with a low frequency of flying. The 100 hours of flying is for the whole organization, not individual RPAS operators. It is the responsibility of the organization submitting a Specific S1 submission to be able to provide evidence of adequate SQEP: this could be in the form of a statement by the RPAS RO / RPAS AM, or log books for RPAS or RPAS Operators.

79. **Training Requirement for Specific S1 RPs.** It is mandated in the MRP that all RPAS operators operating in the Specific S1 space will have received a formal level of training from either a DSAT compliant military course or the CAA RAE GVC equivalent. This is often something that organizations overlook when planning to move to S1 and needs to be built into the organization training pipeline. This is the same level of training as the SO would have received for Open operations.

80. Open LEC holders will be encouraged to aim for Specific S1 privileges as it unlocks increased operational capability for commanders in their RPAS operations.

MAA Approval of move to Specific S1

81. The move from Open to Specific S1 operations is subject to the MAA RPAS Categorization Panel approving the uplift based upon an appropriate claim / argument / evidence-based Safety claim, that demonstrates that the organization has the capability to operate safely within S1 limits. 100 hours of flight and 3 months operation in the Open category is considered the minimum experience. Contact the MAA for further guidance.

Special Purpose Clearances (SPCs)

82. **Description.** In the Specific S1 category of operations, RPAS ►with a MTOW less than 25 kg◄ may operate ►BVLOS within Segregated Airspace◄ to a maximum range of 2 km ►◄. However, there will be occasions when Regulation does not cover a particular activity that a unit may wish to undertake to achieve an effort on operations. This can often be the case where innovation and technology move at a pace that rapidly exceeds regulatory change. A SPC allows for operations outside the normal Specific S1 criteria in support of a named operation or when training for said operation. Deployment of capability that does not fit within the standard regulatory framework particularly for named operations or in support of named operations. They can also be utilized by experienced organizations who want to expand their operational use of RPAS or conduct proof of concept exercises in the area of BVLOS operations. For this, a well-formed Safety argument will be required that provides Assurance that mitigations are in place to ensure that the RPAS will remain in the area of operations and to detect intruding Aircraft to minimize the Risk of MAC. The SPC process is not a mechanism used to circumvent regulatory requirements. SPCs are generally issued for a named operation and for a limited time.

83. SPC allows units to utilize capabilities that would otherwise be restricted by the existing regulatory framework as it develops and matures. The key with all SPC is to ensure that a well thought out and assessed safe approach is laid out for the specific SPC. SPCs will be linked to specific operations and be time bound. SPCs are to be reviewed by the RO and submitted to the MAA for re-approval at the time noted in the SPC or 6 months from submission / renewal, whichever occurs first.

84. They may also be granted where training for operations requires RPAS to be operated outside the limits of the Specific S1 sub-category. Deployment of capability that does not fit within the standard regulatory framework particularly for named operations or in support of named operations. They can also be utilized by experienced organizations who want to expand their operational use of RPAS or conduct proof of concept exercises in the area of BVLOS operations.

85. **Request Process.** Key to a successful SPC submission is a clear and open communication of the activity backed up with Safety considerations and mitigations to ensure the activity remains ALARP and Tolerable acceptably safe. The organization requesting the SPC will make the submission to the MAA, providing a detailed outline of the activity and how it does not fit within the regulatory environment. Details could include; weaponization, BVLOS beyond 2 km, extended altitude, swarming etc. There will be clear articulation of a Risk Assessment with appropriate mitigations in place accompanying the SPC request, ensuring that the Risks to RPs, operating personnel, other organization / MOD personnel, and the general public through the operation of RPAS remain acceptable. This process is expected to require two-way dialogue between the MAA RPAS team and the SPC applicant to fully understand the request. The request will then be presented at an RPAS Categorization Panel, normally chaired by an OF5, however if the activity is considered to be of a higher RtL it may require 2* approval from within the MAA. The level of thought and detail to the Risk mitigations and detail of the activity is likely to be directly proportionate to the likelihood of the SPC being granted.

86. Trials and development units, or those with significant experience of operating S1 RPAS, who are seeking to conduct proof of concept for BVLOS operations, may also seek approval to operate outside the normal limits for S1 operations. They will also use the SPC process noting that there may not be a linked operation or operational imperative. In addition to the requirements set out above, applicants will explain the imperative for the increased Risk of operating at extended range or at higher MTOW. Examples of previous SPC requests and guidance are detailed below.

a. **Smoke.** An Air Liaison element working with the Army requested the use of a Defendtex D40 with Smoke generator to be utilized on an exercise on Salisbury Plain. With a solid Safety Assessment and other mitigations to track the RPAS in the event of a fly away, the SPC was approved for a limited time. The operation of the RPAS was conducted safely, observed by the MAA and produced the effect of simulating a chemical weapons attack.

b. **BVLOS.** Organization A requested clearance out beyond 2 km as allowed in Specific S1 to a maximum of 5 km. Here the organization requested BVLOS beyond the standard 2 km within extended segregated airspace and away from significant centres of population to allow training for a more realistic operational activities and employment of RPAS.

MAA Authority for SPC Operations (Safe To Operate / Operated Safely)

87. RPAS operations conducted under an SPC present a similar Risk to those in the Specific S2 sub-category but have significantly less technical and Safety Assurance, and are not conducted by an ADH. Therefore, the MAA will be seeking to understand the processes that are put in place to ensure that the Risk remains acceptable (ie the Risk of collision with personnel or other Aircraft remains improbable). The MAA will scrutinize the application to understand how the Layered Safety Approach is being applied and assured and to understand how the RPs have been trained to operate at extended range (where applicable). Where the Risk posed by the RPA to personnel, vehicles or Structures is increased (for example due to the RPA being armed), the MAA will be seeking more robust Assurance that it will remain within the proposed operating volume. ROs will consider mitigations such as reduced endurance, Flight Termination Systems (FTS), or larger ranges.

Interface between Specific S1 and Specific S2 sub-categories

88. RPAS operations, iaw RA 1600¹⁶, within the Specific S1 sub-category have a MTOW of less than 25 kg (including all payloads and releasable stores to include weapons) and can operate BVLOS up to 2 km from the RP.

89. RPAS operations, iaw RA 1600, enter the Specific S2 sub-category at a MTOW of 25 kg or greater. RPAS are also in the Specific S2 sub-category if they have a MTOW of less than 25 kg and are required to operate BVLOS in excess of 2 km away from the RP.

90. Certified RPAS can be of any MTOW and are considered to present an equivalent second and third party RtL to that of crewed aviation.

91. The Specific S1 sub-Category, whilst enabling limited BVLOS operations, has nearly identical regulatory governance requirements to the Open Category and will be viewed in Risk and complexity closer to the Open Category than the Specific S2 sub-Category, which requires an ADH construct to manage increased severity of Risk. Those managing S1 RPAS operations will understand that any deviation from the operating limitations set out in RA 1604 could present a significant RtL. Therefore the RPAS RO / RPAS AM will ensure that S1 RPAS operations are conducted within the limitations set out in their LEC.

92. RPAS intended to be used for swarming and autonomous functions are likely to fall in either the Specific S2 sub-Category or the Certified Category, irrespective of size because the standards and Assurance of these novel technologies are still evolving. The MAA welcomes interaction on sensible standards and levels of Assurance for novel technology in the absence of published standards.

93. Armed RPAS will fall into the Specific S2 sub-Category or Certified Category, irrespective of size. This is due to the increased RtL due to the weapon's effects, which will mark a significant increase in RtL from the basic RPA. This increased RtL requires an ADH chain to manage it. Tailoring of the remaining MRP governance construct for Specific S2 sub-Category is possible on a case-by-case basis to provide a "Specific S2-light" governance framework. Early engagement with the MAA is imperative to gain support for intended Courses Of Action.

94. For Specific S2 categorization requests, a more detailed technical description of the RPAS is required among other additions listed in RA 1600. It would be beneficial to explain why the design is fit for purpose and any standards it has been designed or built to. Inclusion of detail of any Assurance activity that has or is planned to be carried out in support of the technical design would increase equipment Assurance for the MAA. A TASA¹⁷ is required to be submitted with the categorization request, which will detail associated design standards and / or an argument pertaining to how product integrity has been achieved, with particular reference to testing or analysis performed on the Systems Software and Structural Integrity. It is acknowledged that the TASA may be in an early draft at the point of Categorization Submission and a plan for how this detail will be gained is sufficient at this point. Where the suitable Software Design Assurance Level (DAL) cannot be met, the TAA will present the MAA with a software Assurance strategy for review, which will contribute to the software Safety argument in the TASA.

95. When moving from the Specific S1 to Specific S2 sub-category, the RPAS will require a TAA or Type Airworthiness Manager (TAM) to be responsible for the management of the Type Design iaw RA 1015¹⁸. The MTOW of RPAS will determine the rank / grade of the platform TAA. Whilst a full platform Certification is not required, the TAA will evaluate the Type Design in line with the intent of RA 5810¹⁴. If a TAA / TAM is not available, the operator

¹⁶ Refer to RA 1600 – Remotely Piloted Air Systems.

¹⁷ Refer to RA 5012 – Type Airworthiness Safety Assessment.

¹⁸ Refer to RA 1015 – Type Airworthiness Management – Roles and Responsibilities.

may submit the application which will set out who will provide the technical Assurance and why they are SQEP to do so.

96. Specific S1 RPAS have no requirement for Continuing Airworthiness (CAw) management functions or a Chief Air Engineer (CAE). However, for Specific S2 RPAS, CAw requirements are to be managed; this may be achieved by the CAE to the DDH. A CAw Management Organization (CAMO) may not need to be formed.

SECTION 5 – Specific S2 to Certification Pathway

Specific S2 sub-category / Certification Category description

97. Specific S2 and Certified Categories must comply with the full MRP, with derogations as agreed during the categorization process. The Categorization Submission will be made between Outline and Full Business Case to allow the regulatory governance framework to be agreed and for contracts to be tendered to ensure compliance. Full Assurance and analysis of the equipment is not considered reasonable at this point, but the plan for compliance is required.

Certification

98. Certification is defined by the MAA in the MAA02 MAA Master Glossary as: *“Recognition that a Product, Part or Appliance, organization or person complies with the applicable Airworthiness requirements (as agreed with the certifying authority).”* Full certification allows RPAS operations to integrate with crewed Aircraft (in controlled airspace, or outside controlled airspace when equipped with a certified Detect and Avoid system) and to operate over most ground, regardless of population density.

99. Where less robust technical Assurance is available, either due to the nature of the design, or the time available, the RtL can be mitigated by operating over areas of lower population density and / or where encounters with crewed Aircraft are less likely. See the section on the Specific Operating Risk Assessment (SORA) methodology at Annex A.

100. As an RPAS operating requirement becomes more complex and a greater RtL and / or equipment is identified, the more stringent the requirement to demonstrate compliance and conformity to a set of Design Standards will be. The MAA has its own Certification standards for RPAS contained within Defence Standard 00-970 Part 9, which have been developed from the following the North Atlantic Treaty Organization (NATO) Standardization Agreements (STANAG).

101. Whilst the MAA has its own certification standards for RPAS, the TAA can propose to meet any set of design and / or Certification standards, provided they can generate an argument detailing why the proposed standards are acceptable and will provide a safe equipment outcome.

102. In a categorization proposal, the MAA Certification Division reviews all categories of RPAS for design conformity or compliance to named standards to inform judgement on the extent of equipment Assurance the RPAS design provides against its intended role and use. It is recommended that categorization proposals include any standards used, as well as any Assurance activities being carried out. Software and hardware development standards are usually of particular interest due to the dependency that Safety mitigations routinely have on these areas.

103. If an RPAS require Certification, RA 5810¹⁴ provides Regulation for achieving this, with supporting guidance material found in the Manual of Military Air System Certification (MMAC).

Organizational Approvals

104. RA 1005 requires organizations letting contracts in the DAE to ensure activities are carried out by competent organizations. The following MAA organizational approval schemes are the preferred way to achieve this:

- a. **Design Approved Organization Scheme (DAOS)**¹⁹. The scheme includes Design Organizations that conduct design and development of RPAS within the Specific S2 sub-category and Certified Category.

¹⁹ Refer to RA 5850 – Military Design Approved Organization (MRP Part 21 Subpart J).

(1) **For Specific S2 sub-category RPAS only:** The contracting organization may seek derogation from the requirement for DAOS where they believe that the Risk associated with the proposed operation does not warrant that level of Assurance of the Design Organization. Alternatively, the Design Organization may hold an appropriate alternative Part 21 Sub-Part J design approval that is considered suitable. In these instances, a justification for derogation from this requirement will be provided within the Categorization Submission for consideration by the MAA.

(2) **For Certified Category RPAS only:** Where the Design Organization holds an appropriate alternative Part 21 Sub-Part J design approval, the contracting organization may judge that this is appropriate and derogate this requirement through submission of an AAMC iaw MAA03 to confirm formal MAA endorsement of this position.

b. **Maintenance Approved Organization Scheme (MAOS).** The circumstances under which a MAOS approval is required are detailed in RA 1005(3); to summarise, MAOS is required only where contractors are conducting on-Aircraft Maintenance, or component level Maintenance on government property. In all other cases the contracting organization bears the responsibility for assuring themselves of the competency of the Maintenance provider. If the contracting organization judge that a MAOS approved is required by Regulation, but the cost would be disproportionate to benefit, then an AAMC request will be submitted iaw MAA03 to gain MAA endorsement of this position.

c. **Contractor Flying Approved Organization Scheme (CFAOS).** For RPAS intended to operate in the Specific S2 sub-category or Certified Category, see RA 2501²⁰.

105. Gaining an MAA organizational approval may not be practicable for an RPAS, the Categorization Submission will provide a credible Safety argument justifying why the activity is acceptably safe in the absence of an MAA organizational approval.

106. Gaining organizational approvals, or expanding the scope of existing approvals, is not always a large task. The lead time to schedule an Audit visit can take time, but the effort required to gain them may not be proportionate to the overall time elapsed. Companies are able to claim credit for existing processes and a simple mapping exercise could suffice. Early contact with the MAA to understand the smoothest path to gaining organizational approvals is strongly recommended.

Agreed Safety Target

107. Whilst Certified Category RPAS are required to identify a Design Safety Target in their Categorization Submission, Specific S2 sub-category invites a proposal that will result in an Agreed Safety Target iaw RA 1230.

108. This will be qualitative and has contributions from both the Safe to Operate and Operated Safely arguments within a peacetime environment. Whereas a crewed Aircraft iaw RA 1230 is required to have a probability of loss of Aircraft or technical Fault leading to serious injury or death of less than 1×10^{-6} , S2 category RPAS will likely have a higher probability of loss of Aircraft, but operating mitigations will bring the proposed Safety Target to a probability of less than 1×10^{-6} to cause death or serious injury or MAC. This argument can be based on reasonable assumptions, with a plan to refine through the platform life. Where SORA methodology is used²¹, the following table can provide a guide for acceptable operation failure rate contribution based on Specific Assurance and Integrity Level (SAIL) category:

²⁰ Refer to RA 2501 – Contractor Flying Approved Organization Scheme.

²¹ See Annex A for further details.

Table 1: SAIL category

| SAIL Level | I | II | III | IV | V | VI |
|---|-----------|-----------|-----------|-----------|-----------|-----------|
| Operational Failure Rate (Probability of loss of control per flight hour) | 10^{-1} | 10^{-2} | 10^{-3} | 10^{-4} | 10^{-5} | 10^{-6} |

Derogations for Specific S2 sub-category RPAS

109. The Applicant for a Specific S2 sub-Category must propose an appropriate MRP governance framework for the operation through Categorization Submission, although the default position is that compliance is required with the full MRP. An accompanying argument will be made to justify any derogations proposed. If the MAA agrees with the proposal, then it will be confirmed in the LEC. Suggestions that may commonly be appropriate for S2 sub-Category are found in Annex A.

SECTION 6 – Occurrence Reporting

Air Safety Information Management System (ASIMS)

110. ASIMS is a web-based application to support the reporting, management and analysis of Air Safety Occurrences, investigations, and recommendations. Occurrences are reported through a Defence Aviation Safety Occurrence Report (DASOR).

111. Occurrence reporting and investigation requirements are mandated in RA 1410 with DASOR timelines contained at RA 1410 Annex A. Any event with an Air Safety implication will be reported, with specific RPAS guidance contained within the RA 1600 series. The exception to this is Occurrences involving sub-250 g Open A1, A2 and A3 category RPAS, defined as operations presenting a low Rtl conducted iaw defined boundaries.

112. ASIMS is accessible online through any device connected to the internet at <https://asims.ice.mod.gov.uk>. Any individual involved in the support of military aviation can apply for an ASIMS account, this is done by contacting the ASIMS helpdesk at dsa-maa-asims@mod.gov.uk.

Reporting

113. There are 3 methods of reporting using ASIMS:

- a. Log in to ASIMS and select **Create New DASOR** from the ASIMS Home page.
- b. Log in to ASIMS and select **Create Anonymous DASOR** from the ASIMS Home page.
- c. Use the DASOR PDF forms at <https://www.gov.uk/government/publications/defence-air-safety-occurrence-report-dasor-forms>. These are to be used when the reporter does not have immediate access to ASIMS. A user log on is not required.

Note: If method c. is used, the PDF forms will be sent to the relevant Flight / Air Safety Office of the Station the report is to be raised on, such that the DASOR can be retrospectively submitted onto ASIMS.

114. Complete as many of the fields on the form as possible; fields marked red are mandatory which include:

- a. **Occurrence Type.** Select the Occurrence type for the report dependent on the environment of the event.
- b. **Additional Reports.** The reporter will consider the use of the additional reports to provide further information. Select any additional reports that are deemed relevant and complete as many of the fields on the form as possible.

Note: Selecting an additional report will add additional fields for completion in the reporter's view. For reporters using PDF forms the additional forms are separate to the reporter PDF form.

c. **Details of Individual Reporting Occurrence:**

- (1) **Rank / Title.**
- (2) **Full Name.**
- (3) **Job Title.**
- (4) **Contact Number.**
- (5) **Email Address.**
- (6) **Was this DASOR generated from an In-form / Error Management System (EMS) report.** Indicate if this issue was initially raised using an In-Form

or alternate EMS report and has been subsequently transferred to ASIMS. If yes, then the originating In-Form / EMS reports serial number is required.

Note: The reporter details will be automatically populated if using the Create New DASOR option. If the reporter wishes to report anonymously, they will use the **Create Anonymous DASOR** option where the user details are not populated and are optional.

d. **Occurrence Details:**

(1) **Date of Occurrence.** Enter the date of Occurrence manually or use the calendar. Select the **Today** button to enter the current date.

(2) **Time of Occurrence.** Enter the time of the Occurrence either manually or using the drop down (note the drop-down values can be amended once selected). Select Local or Zulu as appropriate.

(3) **Time of Day.** Enter the light level at the time of the Occurrence.

(4) **Place of Occurrence.** Enter the location of the Occurrence, Station / Unit or Building.

(5) **Country.** Select the country in which the Occurrence occurred.

(6) **Ship / Station / Organization.** Select your Ship / Station / Organization from the drop-down list.

(7) **Unit / Squadron / Flight.** Select your Unit / Squadron / Flight from the drop-down list.

Note: Ensure the correct Ship / Station and Squadron / Unit are selected to ensure that the DASOR workflow functions correctly; unless instructed otherwise, select your home Ship / Station and Unit / Squadron irrespective of where the Occurrence took place.

e. **Aircraft Involved:**

(1) **Aircraft Registration.** Enter the Aircraft registration number (or part of the registration), Aircraft type or mark and select the Aircraft from the list. Enter N/A if the registration is not known.

Note: If the Aircraft registration relates to an RPAS where only the Type registration is recorded in the MAR then an additional box is displayed. This field is used to record the unique Air System serial no of the specific RPAS being reported.

(2) **Aircraft Type / Mark.** Select the relevant Aircraft Type / Mark. If the Aircraft registration selected is on the MAR, then this field will auto-populate.

f. **Flight Details.** If the report Incident type is Air then the following fields are mandatory:

(1) **Nature of Flight.** Select the nature of flight.

(2) **Flight Phase.** Select the phase of flight at the time of Occurrence.

g. **Description of Event:**

(1) **Brief Title.** Enter a brief title of the event; try to describe the Air Safety issue, using unambiguous language appropriate to the Risk (neutral - not alarmist). Please use 'Sentence case' and expand any abbreviations.

Warning: This field is not to be used to describe the task being undertaken at the time of the Occurrence.

(2) **Narrative Description of Event.** Enter a narrative of the event; try to describe the Air Safety issue, using unambiguous language appropriate to the Risk (neutral - not alarmist). Please use Sentence case and expand any abbreviations. This field is not to be used to describe the task being undertaken at the time of the Occurrence. The narrative must consider:

- (a) All the facts pertinent to the Air Safety Occurrence.
- (b) Your view on how the Occurrence developed.
- (c) How the Occurrence could have been worse.
- (d) Any mitigations that worked.
- (e) Those mitigations that failed.
- (f) Any proposed solutions.

Warning: Do NOT attribute blame, include personal information (Names, addresses etc.), be inflammatory or opinionated; or include information that is above OFFICIAL.

(3) **Perceived Severity of Occurrence.**

- (a) **High.** There are few or no remaining barriers that could credibly have prevented a loss of life or significant injury, leaving outcome to chance.
- (b) **Medium.** The remaining barriers are weak or can be missed, leaving a clear path to loss of life or significant injury.
- (c) **Low.** The remaining barriers appear adequate in the protection they offer against loss of life or significant injury.
- (d) **Negligible.** There is no readily conceivable means through which this Occurrence could have led to a loss of life or significant injury.

115. Once the fields are complete:

- a. Select **Review Report >>** and check the details before confirming submission.

Note: An error message will be displayed if any mandatory fields have not been completed (ASIMS submissions only).

- b. PDF forms. Send to the unit Point of Contact, typically the unit Flight / Air Safety Cell or EMS coordinator.

116. Detailed ASIMS and DASOR guidance can be found in the ASIMS User Guide at the following link: <https://www.gov.uk/government/publications/air-safety-information-management-system-asims-user-manual>.

117. Online ASIMS Training can be found at the following link <https://asims.ice.mod.gov.uk/asims/training/index.html>.

Feedback

118. Feedback on System Bugs, Change Requests or wider ASIMS issues can be submitted via the ASIMS Helpdesk at dsa-maa-asims@mod.gov.uk or via the ASIMS Microsoft Teams Group.

SECTION 7

Enclosed Space Operations

119. The MRP does not apply if you are flying in enclosed spaces. Flights within buildings, or within areas where there is no possibility for the drone to escape into the open air (such as a closed netted structure) are not subject to MRP. One of the key Risks in the event of an RPAS fly away event is the danger this could present to other air users, clearly this is mitigated when operating in enclosed spaces (eg indoors or within netted areas). Good Health and Safety policy, Duty of Care, and detailed Risk Assessments will still be carried out and a common-sense approach to operations be taken.

SECTION 8

Operational Imperative (Named Operations)

120. **Due Regard.** The requirement for Due Regard stems from International Civil Aviation Organization (ICAO) Article 3(d) which states that when countries issue Regulations for their state Aircraft, Contracting States will have '*due regard for the navigation of civil aircraft*'. What this means, in essence, is that you need to operate in a way that maintains separation from civil traffic either through the use of: segregated airspace, or the ability to detect and avoid the civil traffic.

121. There is more to it, for example ensuring that crews know where civil traffic is likely to operate, under what rules and what Air Traffic Control to speak to. However, the key issue is that of regulating to ensure that state Aircraft will not endanger civil Aircraft.

122. Our Regulations require that when RPAS operate overseas, they either operate iaw national or international legal requirements or, where ICAO procedures do not apply, which is generally over international waters, then under Due Regard.

123. Very simply, RPAS will invariably find it very difficult to operate under Due Regard, as this is primarily intended for crewed aviation over international waters where the crew is responsible for not hitting things or another Aircraft (of which there is likely to be none, less the British Airways flight taking holiday-makers to Florida at 35,000 ft!).

124. If an RPAS capability is part of an invading force (uninvited by host nation) then it operates under an Airspace Control Order; no problem. If it is 'invited' in (eg Kosovo) then it will be operated iaw with the law of the host Nation. In accordance with RA 2320(1), for Specific S2 and Certified RPAS operations, the ADH will also ensure that the RtL from collision with any vessels, vehicles, structures personnel or the surface is ALARP and Tolerable, utilizing the layered Safety approach if operating BVLOS.

125. 'Due Regard' "*...carries a personal responsibility on the part of the Aircraft Commander and / or handling pilot to maintain separation from other Aircraft, vessels and objects (such as offshore platforms)...*"; to operate under 'Due Regard' the ADH will have to demonstrate that civil Aircraft can be detected and avoided. With current in-service systems this will be a challenge:

- a. Aircraft **should** be operated in Visual Meteorological Conditions (VMC).
 - VMC not relevant as there is no pilot to 'look out', looking about with the sensor is not sufficient.
- b. Aircraft **should** be operated within radar surveillance and under control of a surface or airborne radar facility.
 - Likely not available in operational theatres.
- c. Aircraft **should** be equipped with airborne radar and qualified operators sufficient to provide separation between themselves and other Aircraft.
 - RPAS likely not equipped.

Therefore, organizations must consider Risk transfer SOPs and ensure that any transfer of Risk from the RPAS RO / ADH to the operational commander is recorded.

Autonomy and Artificial Intelligence

126. ICAO has currently defined autonomous Aircraft as:

*"an unmanned aircraft that does not allow for pilot intervention in the management of the flight"*²².

²² ICAO Cir 328, AN/190, Unmanned Aircraft Systems (UAS), www.icao.int/meetings/uas/documents/circular_328_en.pdf.

However, there are varying levels of automation already on Aircraft today, such that pilots of commercial airliners often perform monitoring functions for much of the flight. From a regulatory perspective, as the role of the RP in operating the RPAS decreases, with particular regard to taking avoiding action to maintain safe separation from other Air Systems and non-involved personnel on the ground, the amount of technical Assurance required will increase.

127. Artificial Intelligence (AI) is defined by European Aviation Safety Agency (EASA) as:
'any technology that appears to emulate the performance of a human'.

One form of AI that is fundamental to the achievement of autonomy in RPAS is Machine Learning (ML) which is the use of data to train algorithms to improve their performance. EASA has proposed 3 levels of AI / ML:

- a. Level 1: Assistance to Human. This would concentrate on applications like assistance and augmentation of crew for tasks ranging from flight preparation to flight execution.
- b. Level 2: Human / Machine Collaboration. The machine can perform the functions autonomously but still under the supervision of the human.
- c. Level 3: More Autonomous Machine. The machine can operate fully autonomously, with the human in the loop at the design and oversight phases.

128. AI / ML and autonomy will require novel methods of Assurance and standards. These are still being developed by regulators. AI Safety mitigation could be provided by:

- a. Keeping a Human In Command (HIC) or Human In The Loop (HITL) to intervene when Safety might be compromised.
- b. Monitoring of the output of the AI / ML and passivation of the AI / ML application with recovery through a traditional backup system (eg Safety net).
- c. Encapsulation of ML with rule-based approaches (eg hybrid AI). For example, rules-based software could be used to maintain an RPAS within its operating area, whilst the operations within that area are determined by machine learning algorithms.
- d. Monitoring of AI through an independent AI agent;

129. Regardless of changes to RPAS capability and regulation, the onus will remain on the operator to demonstrate how their operations are safe to operate and can be operated safely.

Swarming

130. An RPAS swarm is defined as:

The operation of more than one RPA controlled collectively rather than individually²³. Swarming operations are likely be categorized as Specific S2 or Certified according to the assessed RtL.

131. Additionally, an RPAS swarm may have the following characteristics:

- a. The group seems to act as a unit, but each individual executes local behaviours.
- b. Swarming members communicate with one another.
- c. Each RPAS will not focus on a designated position, but rather will position itself relative to other RPAS. This position may also be impacted by external cues, such as

²³ Derived from Civil Aviation Authority. "Unmanned Aircraft Systems. Rotary Wing Swarm Operations – Visual Line of Sight Requirements, Guidance & Policy. CAP 722E".

electronic signal strength to optimise communications, EW effects or other electromagnetic effects. Mission requirements may dictate a swarm member exits or leaves.

132. Swarms of RPAS present an increased RtL for the following reasons:

- a. The number and concentration of RPAS presents a greater Risk to non-involved persons on the ground and to crewed Aircraft in the air.
- b. A greater number of RPAS presents a greater Risk of any departing controlled flight and leaving the area of operations.
- c. Monitoring a large number of RPAS and taking timely and effective corrective action is a more demanding task for a single RP. Autonomy may be required to assist.

133. The Risks presented above demand robust Assurance of the mitigations to ensure against MAC between the swarming RPAS, departure from the operating area, and MAC with crewed Aircraft.

134. Swarming operations are likely to be categorized as Specific S2 or Certified according to the assessed RtL.

Armed

135. Armed RPAS present an increased RtL that necessitates additional controls to mitigate the Risk to ALARP and Tolerable. As all armed RPAS will present a credible and foreseeable RtL, they must be operated under a full ADH chain, thus they will be categorized as S2 or Certified, regardless of size or range of operation. For RPAS operations outside Danger Areas, the RPAS must be certified. For Armed RPAS operations that will be limited to Danger Areas or theatres of operation, Specific S2 may be acceptable, depending on the assessed RtL.

136. For Armed RPAS, the most significant concern is an uncontrolled impact with the ground outside of a range / danger area. Experience of the conflict in Ukraine has demonstrated the desirability of arming relatively small and cheap RPAS. Whilst this can be an effective and desirable capability, it is often difficult, if not impossible, to provide the appropriate levels of Assurance due to the way in which the RPAS have been designed and manufactured. Producing certifiable RPAS can be expensive and time consuming and Defence will seek to develop an Armed capability quickly and at low cost.

137. The MOD has a duty to ensure that the Risk to the MOD employees and the general public is reduced to ALARP and Tolerable. There are many examples of loss of control of RPAS that have resulted in departure from the planned operating area. It is not Tolerable for such an event to occur when the RPAS is Armed.

138. When applying for categorization of armed RPAS, the MAA will wish to see evidence that a robust Risk Management process is in place and that the ADH chain is SQEP to manage the RtL. Where it is not practicable to certify the RPAS, the MAA will seek robust Assurance that the RPAS cannot depart the range in the event of lost link or fly-away. The best way to achieve this is through robust Assurance of a FTS. Ideally this would be activated by an independent link, separate to that used for routine control of the Aircraft, which would activate a mechanically robust FTS that can reliably and quickly bring the RPA down inside the designated area of operations.

139. A request for categorization in the Open and Specific S1 categories for an RPAS that can be armed, but will only be flown in an unarmed configuration may be submitted. However, they must be flown iaw their issued LEC which will specify they must at no times be armed during flying in these categories.

SECTION 9 – References

140. Advice and guidance on the topics raised in this manual can be obtained from:

Table 2: Contact Details

| Organizations | Contact details |
|---|--|
| Military Aviation Authority | DSA-MAA-MRPEnquiries@mod.gov.uk |
| Army Infantry Trials Development Unit | ITDU-GROUPMAILBOX@mod.gov.uk |
| MOD A Block (MAB) | MAB2-Ops-Group-Mailbox@mod.gov.uk |
| Air and Space Warfare Centre (ASWC) | ASWC-TestEvalCell@mod.gov.uk |
| RN 700X Naval Air Squadron | NAVYCU-700XGateway@mod.gov.uk |
| The Defence RPAS Network | MOD-DefenceRPASNetwork@mod.gov.uk |
| DE&S RPAS DT | DESRPAS-Minis-Enquiries@mod.gov.uk |
| DE&S Future Capability Group | |
| Defence Science and Technology Laboratory | |
| QinetiQ | |

Annex A

Suggested derogations that may be appropriate for Specific S2 sub-category RPAS

1. Whilst the default position for Specific S2 sub-Category Categorization Submissions is to comply with the full MRP, it is accepted that due to the wide range in RPAS types in this category that derogations to the MRP are often appropriate. These are proposed and justified in the Categorization Submission for MAA approval in the LEC.
2. The following derogations may be considered appropriate depending on the characteristics and use case of the RPAS:
 - a. **CAW Management.** The CAE²⁴, to the DDH, or the AM in a MAOS approved organization, may manage CAW (in lieu of a CAMO) and ensure that Specific S2 RPAS are maintained iaw the RA 4800 Series and RA 4900 Series. As a minimum they will:
 - (1) Be a professionally registered engineer as either an Incorporated Engineer where supervised by a professionally registered Chartered Engineer (CEng), or a CEng when operating without supervision²⁵.
 - (2) Have previously held military Engineering Authorizations at minimum level G, or five years relevant work experience of which at least two will be from the aeronautical industry in an appropriate position.
 - (3) Implement a recognized Quality Management System and procedures to provide Part 145 and Part M Assurance to their DDH / AM(MF) as appropriate.
 - b. The CAE to the Operating Duty Holder (ODH), or the AM in a MAOS approved organization, may authorize deviations from the procedures detailed in the RA 4000 Series²⁶, for the items listed below:
 - (1) Ground Handling.
 - (2) Engineering Authorizations.
 - (3) Maintenance by non-engineering tradesperson.
 - (4) Tool Control.
 - (5) Independent Inspections.
 - (6) Air System Maintenance Documentation.

Such deviations will be recorded, outlining the basis for judgement, in the LEC, the Station / Ship / Unit Aviation Engineering Standing Orders (AESOs), or Front Line Command Mid-Level Orders; or for MAOS approved organizations in the Maintenance Organization Exposition, or Operations Manual.

- c. **Type Airworthiness (TAW) Management.** The TAA²⁷ will ensure Changes in Type Design²⁸ of RPAS operating in the Specific S2 sub-category is carried out iaw the 5000 Series²⁹. Alternative approaches can be requested through Categorization Submission accompanied by a robust Safety argument, which considers the platform

²⁴ Refer to RA 1023 – Chief Air Engineers – Air Safety Responsibilities.

²⁵ Refer to RA 1002 – Airworthiness Competent Persons.

²⁶ Refer to the RA 4000 Series: Continuing Airworthiness Engineering Regulations.

²⁷ Where the Air System is Civilian-Owned, ownership of regulatory responsibility by either the TAA or TAM needs to be agreed within the Sponsor's approved model for TAW management; refer to RA 1162 - Air Safety Governance Arrangements for Civilian Operated (Development) and (In-Service) Air Systems, or refer to RA 1163 - Air Safety Governance Arrangements for Special Case Flying Air Systems. Dependant on the agreed delegation of TAW responsibilities TAM may be read in place of TAA as appropriate throughout this RA.

²⁸ Refer to RA 5820 – Changes to Type Design.

²⁹ Refer to the RA 5000 Series: Type Airworthiness Engineering Regulations.

RtL and the reasons that the proposed Safety argument is acceptable. The following derogations are accepted:

- (1) For RPAS with a MTOW below 150 kg, the permissible RPAS TAA¹⁸ rank / grade may be OF4 (or equivalent)³⁰.
- (2) A Design Safety Target³¹ is not required. Instead a TASA will be used to inform an agreed Safety Target³² (which will be detailed in the LEC).
- (3) RPAS operating in the Specific S2 sub-category are not required to comply with RA 5615³³.
- (4) For RPAS that are Commercial Off-The-Shelf (COTS), any recognized Design Standards used during development will be recorded. If the RPAS is not designed to any MAA recognized Airworthiness standards (eg STANAGs, Defence Standard (Def Stan) 00-970, etc), then it will still be demonstrated how product integrity is achieved. This argument will be contained within the TASA¹⁷.
- (5) For RPAS that are not COTS³⁴, RA 5103³⁵ will be complied with, but is only required to include as a minimum:
 - (a) The RPAS type.
 - (b) A list of all relevant standards that were used during the design (ie any software Design Standards, EASA Certification Specifications, Joint Aviation Requirements, etc).
 - (c) A statement regarding the testing or analysis performed to ensure the Systems Software and Structural Integrity; reference made to the TASA.
- (6) It is possible that RPAS (both the RPA and engine(s)) operating in the Specific S2 sub-category will not be designed to any recognized certification standards. This may be acceptable; however, the onus is on the TAA to ensure that the RPAS is still safe to operate within the limitations of the RTS / appropriate MPTF³⁶.
- (7) Whilst some Specific S2 sub-category RPAS will have software developed against recognized standards, it is more likely many will not. In such cases the software Assurance strategy will be presented to the MAA for review as part of the RPAS Categorization Submission. The software Assurance strategy will be used to develop the software argument in the TASA, giving particular attention to software items whose failure could lead to uncontrolled flight and / or a catastrophic loss. RPAS with insufficient design Assurance for Programmable Elements will have severe restrictions and / or limitations placed on their AoR.
- (8) The TAA will:
 - (a) Ensure that an evaluation process carried out in line with the applicable elements of RA 5810.
 - (b) Submit their RTSR to the MAA for review before first flight of a new RPAS type and upon issue of a new LEC, where requested by the MAA.

³⁰ For RPAS with a MTOW of 150 kg and greater, the TAA may be OF5 (or equivalent). Refer to RA 1015 – Type Airworthiness Management - Roles and Responsibilities.

³¹ Refer to RA 1230 – Design Safety Targets.

³² Refer to RA 1605(2): Equipment Safety.

³³ Refer to RA 5615 – Propulsion System Production Design Assurance.

³⁴ RPAS that are COTS do not need to comply with RA 5103.

³⁵ Refer to RA 5103 – Certificate of Design.

³⁶ Refer to RA 1305 – Military Permit to Fly (In-Service), (Special Case Flying) and (Single Task); and Refer to RA 5880 – Military Permit to Fly (Development) (MRP Part 21 Subpart P).

(c) Develop and maintain procedures in the Air System Document Set to ensure the intent of RA 5212³⁷ and RA 5601³⁸ is met.

(d) Ensure that:

i. The mass of any installed / removable equipment and Systems is reported, as described in RA 5212, before the RTS / appropriate MPTF is published.

ii. An evaluation process is conducted on the engine³⁹ to demonstrate that an appropriate level of Safety can be achieved. The evaluation will form part of the TASA.

iii. For COTS engines, any recognized Design Standards and qualification evidence used during development is recorded. If the engine is not designed to any recognized Airworthiness standards the onus is on the TAA to reference how product integrity is achieved. This will be contained within the TASA.

iv. Effective weight and moment control measures are in place for the RPA to ensure the weight and moment remains within limits.

(9) It is common that the design enables organizations operating the RPA to routinely exchange components, including engines, between individual RPA. For some RPA, the weight is controlled by limiting the extent of Repairs carried out. As such, the weight and moment is traditionally checked after assembly, and / or prior to every flight.

(10) Role fit equipment may not be applicable; however, there will still be a method for weight and moment to be easily checked by the RPAS operating organization prior to flight.

(11) Engines that are not required to undergo a formal Certification process will need a robust TASA to be developed.

(12) A documented process for controlling the configuration of all items that would affect the TASA, similar to the intent of RA 5301⁴⁰, needs to be provided. Maintaining configuration control can require a high level of effort. Due to the reduced RtL associated with RPAS operating in the Specific S2 sub-category and the conditions and limitations that they are operated under, the benefits of a robust Configuration Management Plan may not provide significant gains to the safety of the RPAS. For these reasons, the requirements outlined in RA 5301 are not mandated; however, for any item that may affect the TASA, a documented process will be utilized.

(13) The plan for Integrity Management (IM) needs to be presented to the MAA by the TAA. Subject to the assessment carried out as part of the TASA for the RPAS, which recognizes the potential outcome of loss of CAw, the TAA needs to apply the principles of RA 5726⁴¹ to ensure Airworthiness is maintained throughout the life of the RPAS.

(14) The requirements for IM are no different than crewed Aircraft except for the requirement for On-board Load Monitoring / On-board Data Recording (OLM / ODR) programmes. These programmes are implemented at the discretion of the TAA. When determining whether to implement an OLM programme, the TAA

³⁷ Refer to RA 5212 – Mass and Centre of Gravity Determination.

³⁸ Refer to RA 5601 – Propulsion System Design and Certification.

³⁹ The term “Engine” is used throughout this RA to describe all propulsion devices that could be used in RPAS designs including; Gas Turbine Engines, Internal Combustion Engines, Electric Motors, Rockets, etc.

⁴⁰ Refer to RA 5301 – Control of Designs.

⁴¹ Refer to RA 5726 – Integrity Management.

ought to consider the impact that fatigue may pose on the airframe given its forecasted life span, and whether the usage is sufficiently limited by flight control and any self-protection Systems so that flight outside the scope of the Design Usage Spectrum (DUS) articulated in the Statement of Operating Intent and Usage (SOIU) is prevented.

(15) **Tailored IM approach for RPAS operating in the Specific S2 sub-category.** In preference to separate IM as required by RA 5726, the TAA may assure IM via a combined tailored approach (ie Structural, Systems, and Propulsion IM). A combined IM approach will ensure the intent of RA 5726 is met and it is expected that this is delivered via a suitable management framework such as ESVRE. The combined IM approach will include as a minimum:

- (a) Establish – A combined tailored Air System Integrity Strategy Document (AISD) and Statement of Operating Intent (SOI). All elements of the RPAS that contribute to safe operation including Ground Control Stations will be included within the AISD.
- (b) Sustain – A framework that includes: an IM Plan and IM Working Groups that will provide CAw for all elements of the RPAS. A system will be in place to determine and control RPAS mass, Centre of Gravity, and mass distribution.
- (c) Validate – Annual SOIU review extended to every 2 years, OLM / ODR programmes are not required where the RPAS usage can be shown to be sufficiently limited by flight control or similar self-protection Systems such that flight outside the scope of the DUS articulated in the SOI is prevented.
- (d) Recover – Component failures will be recorded with enough fidelity to permit a fleet-wide assessment of structural health. If the fleet is experiencing repeated failures which have potential to result in the loss of the RPAS, this will be documented and an appropriate management strategy implemented. Reviews of component lifing will be carried out, particularly where components that do not have individual lifing records may be moved between RPAS and may exceed their original cleared life.
- (e) Exploit – Undertake structural Hazard and Accident analysis in the event of Airworthiness Risks arising from Structural Integrity concerns.

(16) **Ageing Air System Audit.** RPAS with an anticipated service life of less than 6 years are exempt from the requirements of an Ageing Air System Audit.

(17) The TAA will obtain sufficient proof that degradation and the interaction of apparently unrelated ageing processes are accounted for and that any associated Risks are being mitigated appropriately to meet the intent of RA 5723⁴².

(18) The Risk to Airworthiness due to the ageing of RPAS In-Service is partly mitigated by IM iaw RA 5726. However, the unpredictable nature of degradation and the interaction of apparently unrelated ageing processes are often found only by an additional rigorous periodic Audit of trend data, procedures and the RPAS's physical condition.

(19) The RPAS may have inherent design characteristics which would reduce the requirement for demonstrable proof of IM as the RPAS ages (ie components

⁴² Refer to RA 5723 – Ageing Air System Audit.

that are inspected after every flight and replaced on condition, solid foam construction with no hidden critical structure, etc).

- d. **RTS.** A modified / bespoke approach following the guidance of RA 1360⁴³ may be used for independent MAA Assurance of RTSR. The approach to be applied will be agreed between the DT and the MAA and will be proportionate to the RtL presented.
- e. **MPTF (In-Service).** A modified / bespoke approach following the guidance of RA 1305 may be used for independent MAA Assurance of MPTF(IS)-R. The approach to be applied will be agreed between the DT⁴⁴ and the MAA and will be proportionate to the RtL presented.
- f. **Occurrence Reporting**⁴⁵. ADH / AM(MF)s may waive the requirement for an Occurrence Safety Investigation (OSI) down to a Local Occurrence Investigation (LOI) for an accident where the means of loss is consistent with the operating concept of use of the RPAS. Ultimately it is for the ADH / AM(MF) to decide that there is nothing to be gained from a formal OSI. As a minimum the subsequent LOI still requires codification, iaw RA 1410, by the Incident Manager prior to being closed.
- g. **Military Airworthiness Review Certificate (MARC).** A MARC may not be required. Instead, a sample Audit of the Airworthiness of individual platforms may be used in lieu.

SORA

3. Civil regulators are adopting the SORA methodology to provide a Risk proportionate method to determine the required evidence and assurances needed for an RPAS to be acceptably safe within the “specific” category. It does this by considering the Risk to uninvolved personnel on the ground and the Risk of encountering crewed Aircraft to ensure that the level of Assurance demonstrates that the RtL is comparable to that posed by crewed Aircraft for a given operation.
4. **Applicability for Military Registered RPAS.** For categorization in the Specific S2 category can use the SORA methodology to propose a proportionate level of technical and operating Assurance. Note that a categorization based on the SORA methodology will result in a geographically restricted RTS, although it may be possible to base the categorization of areas of maximum population density and air Risk. The SORA methodology is not appropriate for armed or swarming operations.
5. **Ground Risk.** Ground Risk is based on the highest population density of the ground over which operations are planned and the **average** population density of the adjacent ground over which the RPAS might fly in the event of a loss of control.
6. **Ground Risk Mitigation.** Ground Risk can be mitigated by either:
 - a. Taking measures to operate at times when the population density can be shown to be reduced – either during normal working hours or at night – or by taking measures to reduce the population density (ie controlling access to the ground under the operating volume).
 - b. Technical measures to reduce the energy of impact (eg fitting a ballistic parachute system to be deployed in the event of a loss of control / power).
7. **Air Risk.** Air Risk is based on the type of airspace in which the RPAS operations will be conducted and the nature of the adjacent airspace.
8. **Air Risk Mitigation.** Air Risk can be mitigated by strategic or tactical measures:

⁴³ Refer to RA 1360 – Release To Service Recommendations Preparation and Authorization.

⁴⁴ For Special Case Flying this will be between the AM(MF) and the MAA.

⁴⁵ Refer to RA 1410 – Occurrence Reporting and Management.

- a. Strategic measures are those undertaken prior to flight (eg segregation of airspace, by geography or time, or common flight rules to reduce conflicts).
 - b. Tactical mitigations are those that take place during flight (eg operating VLOS, or have a detect and avoid system).
9. **SAIL.** The SAIL for the operation is calculated using the Ground and Air Risk. This SAIL is then used to determine the integrity and Assurance required to demonstrate a series of Operational Safety Objectives (OSO) that provide confidence that the RPAS will stay under control. This ranges from the applicant making a declaration regarding a technical issue or operational procedure, through providing evidence, to providing evidence that has been independently assured.
10. There are 6 SAILs. If an operation is assessed as being SAIL V or VI, the MAA will require that the RPAS operates in the Certified category. It is likely that most applications will be at SAIL III or IV, although SAIL II may be possible where the operations are conducted in Danger Areas, or over areas of very low population density.
11. **MRP Compliance.** Any operator basing their categorization on the SORA methodology will still be required to comply with the MRP for issues such as RP and instructor qualifications, medical categories, etc. The application will make clear with which RAs they intend to comply.
12. **Engagement with the MAA.** If an applicant wishes to adopt a SORA methodology as a structured argument to support a LEC submission, they are encouraged to engage with the MAA at an early opportunity. Used appropriately, the determination of Ground Risk and Air Risk to assess the Air System's SAIL can provide the basis of required robustness in further structured Assurance argument in the ASSC. The SAIL determination may also be used as the basis for any derogations sought from the MRP.
13. **ASSC.** For ease and simplicity, the ADH may choose to base their ASSC on the OSOs.
14. **SORA Website.** Details on the SORA methodology can be found on the [Joint Authorities for Rulemaking on Unmanned Systems Website](#). Applications can be made by either the operator or a TAA. If the former, the application for categorization must state the engineering SQEP of the individual providing the Assurance for technical OSOs.