UK Civil Aviation Authority

United Kingdom Space Licensing of Rendezvous and Proximity Operations (RPO) Guidance

CAP 3295

Published by the Civil Aviation Authority 2026

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First published November 2026

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The latest version of this document is available in electronic format at: www.caa.co.uk/CAP3295

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CHAPTER 1

Introduction

1.1 Rendezvous and Proximity Operations (RPO) are a specific category of space activities, during which one space object intentionally approaches, manoeuvres in close proximity to, interacts with, or physically engages with another space object. A common reason is to service the space object that is already in Earth orbit (the client space object).

1.2 RPO activities have different characteristics and risks to other spaceflight activities, not least because they involve two space objects in close proximity or contact and each may have separate operators.

1.3 If you want to conduct RPO activities from the UK, you need a space operations licence under the Space Industry Act 2018 (SIA). A 'space operations licence' is a type of space operator licence and was formerly known as an 'orbital operator licence'. There is no separate RPO licence.

1.4 If you are already operating a client space object under a UK space operations licence and want to engage a UK RPO servicer, you must make sure that its operator also holds a space operations licence, specific to the RPO activities.

1.5 This guidance document explains how the Civil Aviation Authority (CAA), the UK's spaceflight regulator, will regulate RPO activities under the SIA and the Space Industry Regulations 2021 (Space Industry Regulations). It explains the key regulatory concepts that apply to RPO activities and the evidence we require from licence applicants about their proposed activities to satisfy the key legislative requirements we assess when determining a licence. It also explains the evidence we need for ongoing monitoring of RPO activities once a licence has been granted.

1.6 It covers situations where the client space objects are already known at the time the licence is being applied for, and cases where client space objects (or additional client space objects) will be identified after a licence has been granted.

1.7 This guidance sits alongside the SIA, the Space Industry Regulations, The Regulator's Licensing Rules (RLRs) and supporting guidance published on our website, in particular the Guidance for Space Operations licence applicants and licensees (CAP 2210) (previous versions of this guidance referred to 'orbital' operations but this has now changed to 'space operations'. Together these materials set out the framework through which we regulate spaceflight activities in the UK. Applicants and licensees are expected to read this guidance alongside these other materials. This guidance does not provide full details of the licence application process.

1.8 The Outer Space Act 1986 (OSA) provides a similar licensing framework to the Space Industry Act 2018, although it does not contain the same breadth of provisions or powers. There are no regulations under the OSA equivalent to the Space Industry Regulations. The OSA may apply to certain UK nationals and UK-based companies undertaking RPO activities from outside the UK. Where appropriate, we intend to apply the principles and practices set out in this guidance to RPO activities intended to be licensed under the OSA.

1.9 This guidance reflects the regulatory approach at the time of publication. Future editions may be updated as necessary.

Who is this guidance for?

1.10 This guidance is for:

- operators who need to apply for, or are applying for, a UK space operations licence to conduct RPO activities from the UK
- operators who already hold a UK space operations licence to conduct, or intend to conduct, RPO activities, and
- operators of client space objects involved in RPO activities with a UK licensed servicer.

1.11 It may also be of interest to the wider space industry, including organisations with longer term ambitions to conduct RPO activities.

1.12 This guidance does not currently cover requirements for UK client objects who are being serviced by a non-UK RPO servicer. Operators who fall into this category are encouraged to contact us to discuss requirements further, by emailing commercialspaceflight@caa.co.uk.

CHAPTER 2

How this guidance was developed

2.1 This guidance was developed as a result of the UK Government-sponsored RPO Regulatory Sandbox (2024-2026). This was a project that brought together the CAA, the UK Space Agency (UKSA), DSIT (now the Department for Business, Innovation, Science and Trade (DBIST)) and a consortium of RPO operators – Astroscale, ClearSpace Today and D-Orbit UK – to develop a shared understanding of how RPO activities are regulated under the UK spaceflight regulatory framework.

2.2 To build this understanding, a Target Mission Concept (TMC) was developed by the consortium, to provide a common reference point for exploring how the UK regulatory framework applies to RPO missions. The TMC set out a hypothetical RPO mission spanning a range of activities. It was then considered against key aspects of the UK spaceflight regulatory framework.

2.3 Many of the conclusions derived from the TMC are detailed in this guidance, in particular in sections labelled ‘TMC example’. These boxes provide examples of how licence applicants could demonstrate the way they would achieve the outcomes required.

2.4 The TMC does not represent any specific planned mission, nor should TMC examples be treated as definitive design parameters or a pre-approved regulatory approach.

2.5 In developing this guidance, we have reflected on the discussions, analysis and findings developed through the RPO Regulatory Sandbox. Where there is any difference between this guidance and the findings or recommendations contained within the RPO Regulatory Sandbox Stage 1 and Stage 2 reports, applicants and licensees should follow this guidance.

TMC example: Mission overview

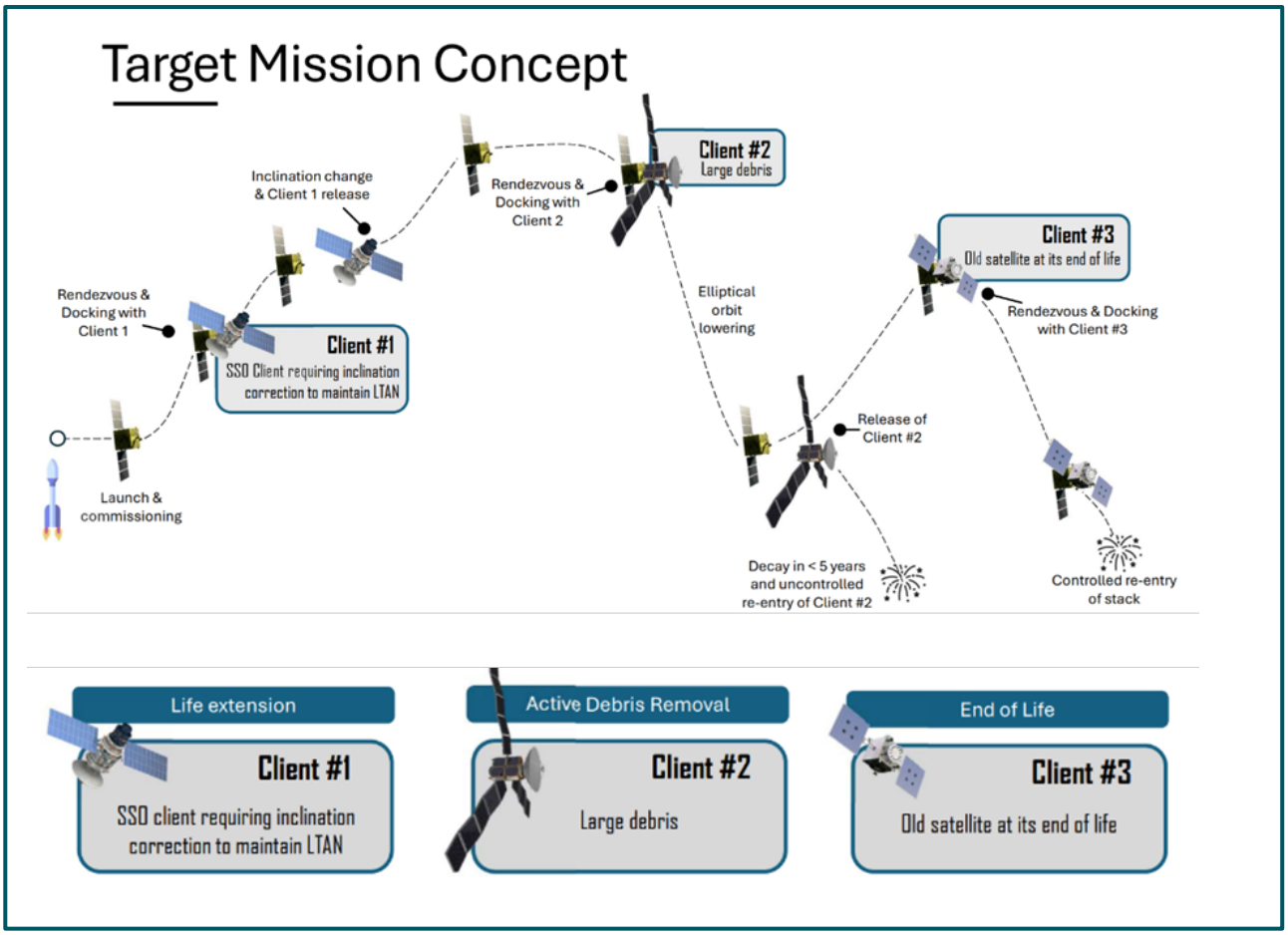
The TMC involves a UK RPO servicer in sun-synchronous orbit (SSO) performing different services over its lifetime for three distinct client space objects:

- Client space object 1 (known at time of licensing): a cooperative, prepared, operational SSO satellite requiring orbital inclination for life extension. The RPO servicer docks, performs an attitude and orbit control system (AOCS) takeover, corrects the satellite’s orbit and releases it.

- Client space object 2 (known at the time of licensing): a large piece of space debris; non-cooperative, non-operational. The RPO servicer captures it and manoeuvres it to a disposal orbit for uncontrolled atmospheric re-entry within 5 years.
- Client space object 3 (unknown at the time of licensing): a cooperative, operational end-of-life satellite. The RPO servicer waits in parking orbit, then captures the satellite and performs controlled re-entry of the combined stack to the South Pacific Ocean Uninhabited Area (SPOUA).

The servicer is launched on a rideshare to 600 kilometres SSO. Its total mission duration is approximately 2.4 years.

Figure 1: The TMC Overview



CHAPTER 3

Overarching regulatory approach for RPO activities

This chapter provides a brief overview of the UK licensing framework and how it applies to RPO activities.

The licensing framework

3.1 RPO activities fall within the scope of space operations licences under the SIA and organisations wanting to conduct RPO activities must apply for a space operations licence. There is no separate licence category for RPO activities. The same regulatory framework applies, with additional consideration given to the specific risks and characteristics of RPO activities.

3.2 Under the SIA, we may only grant a licence if we think fit and are satisfied that:

- the applicant has taken all reasonable steps to ensure that risks to the health, safety and property of others are as low as reasonably practicable (ALARP) and that the level of those risks are acceptable
- grant of a licence will not impair UK national security
- the proposed activities are consistent with the international obligations of the UK, and
- they are not contrary to the national interest.

We must also be satisfied that the applicant has the financial and technical resources to carry out the licensed activities and is otherwise a fit and proper person to do them.

More detail on the licensing process and the information applicants must provide can be found in the Regulator's Licensing Rules (CAP 2221), Space licensing in the UK and Guidance for Space Operations licence applicants and licensees (CAP 2210).

Technical Question Set

3.3 A central part of the application for a space operations licence is responding to the Technical Question Set (TQS). This is where applicants provide the technical, operational and organisational information we assess before making a licence decision. Applicants are expected to use this guidance to assist with completing the TQS (SRG 2228).

3.4 All sections in the TQS are applicable to RPO activities. Questions 4-A-09 to 4-A-23 apply specifically to applications for RPO activities.

Details of the RPO activities

3.5 Where a licence is granted, it will only cover the activities specified in the application, and our assessment will be based on the information provided in the application. For RPO activities, the information we expect to see will include:

- the orbital regions (for example, the altitude, inclination, orbit type) within which the RPO servicer would operate
- the types of service that would be provided
- how the RPO servicer would interact with client space objects
- relevant characteristics of the client space objects, and
- any technical and operational parameters.

3.6 We recognise that for RPO activities, it may not be possible to confirm all the client space objects or mission details at the time of application. If this is the case, applicants can choose to define a mission envelope that sets out the parameters within which RPO activities will be conducted and the scope of the RPO mission as a whole, not just any particular client or phase. This approach enables flexibility for future RPO activities.

3.7 As a minimum, the mission envelope should cover the information listed in paragraph 3.5. This will then form the basis for our assessment, and the licence (if granted) will cover RPO activities carried out within the defined parameters.

Chapter 4 provides further information on how to define a mission envelope.

3.8 Applicants can also adopt a combined approach, providing specific details of any known client space objects while also defining a mission envelope relating to future unknown clients.

3.9 Once a licence is granted, the licensee may carry out activities within the mission envelope without requiring further regulatory assessment for each individual activity. However, the licensee must:

- fulfil all reporting and notification obligations, and
- inform us of any material changes to the mission envelope. Paragraphs 4.14 and 4.15 of this guidance explain when a change is material and when a variation to the licence is required before the proposed activities can be carried out.

What activities require a licence from the UK?

3.10 If you want to operate an RPO servicer from the UK, you must obtain a space operations licence under the SIA that authorises RPO.

3.11 If you are a UK national or represent a UK-based company intending to operate an RPO servicer from a location outside of the UK, you must obtain a space operations licence under the Outer Space Act 1986 (OSA). If this applies to you, please contact us at the earliest possible opportunity by emailing commercialspaceflight@caa.co.uk.

3.12 There is no requirement for client space object operators who are under a non-UK jurisdiction to obtain a licence under the UK regime so that their space objects can be involved in RPO activities with a UK RPO servicer. Instead, they will fall under the jurisdiction of the relevant state that governs their spaceflight or operator regime.

3.13 The space operations licence for RPO covers all RPO activities throughout the entire mission. The RPO operator remains responsible for its RPO servicer throughout, even when physically attached to a client space object.

TMC example: Who needs a UK licence?
In the TMC, the RPO servicer holds a space operations licence under the SIA. Client 1 (US licensed), Client 2 (German registered) and Client 3 (unknown at launch) do not require UK licences. The RPO servicer must satisfy us that its interactions with each client are consistent with our licensing requirements, including (but not limited to) the UK's international obligations and national security considerations. Once granted, the space operations licence covers all phases of the RPO servicer's mission including its RPO activities with client objects that are within the agreed mission envelope.

CHAPTER 4

Defining the mission envelope

This chapter explains what applicants are expected to set out in their mission envelope, what they need to demonstrate, how we assess it, and post-licensing matters.

4.1 An applicant's mission envelope should cover the full scope of the proposed RPO activities, as discussed in paragraph 3.5.

4.2 Applicants are expected to demonstrate, through the TQS and supporting evidence, that:

- all RPO activities within the proposed mission envelope can be conducted safely
- risks have been reduced to ALARP, and
- the residual risk is acceptable.

4.3 This must be done across the full extent of the envelope, not solely at the expected or nominal operating conditions. For example, where the applicant intends to conduct RPO activities within a certain orbital altitude range, its safety assessment must address the worst-case collision risk, orbital lifetime, and probability of successful disposal at the extremes of that range, not just at the expected or nominal operational altitude.

4.4 The mission envelope should be described in objective, measurable and verifiable terms, that is by reference to specific, quantifiable parameters that can be assessed and tested against actual mission performance. For example, "LEO between 400km and 600km altitude" is objective, measurable and verifiable; "low orbit operations" is not.

What parameters should be addressed in the mission envelope?

4.5 The mission envelope should cover both technical and organisational elements:

- **Technical capability parameters** define the physical and functional limits within which RPO activities are to be conducted. These include orbital regions, approach distances, client space object characteristics, interaction mechanisms and autonomy levels.
- **Organisational and governance parameters** define the governance, compliance and jurisdictional and space registration context within which those activities take place. These include staffing and competence, ground segment architecture and client contractual arrangements.

4.6 Table 1 gives examples of the categories of parameters that help define the mission envelope. It also indicates whether a default or baseline value is required.

Table 1: Examples of mission envelope parameters

Parameter	Description	Default / baseline value required
Orbital regions	Altitude range(s) and inclination range within which RPO activities are proposed to take place.	Yes
Relative navigation control	Guidance, navigation and control (GNC) modes to be used during approach and proximity operations.	Yes
Approach distances	Minimum permitted approach distances between the RPO servicer and the client space object.	Yes
Client space object characteristics	Mass range, size range, maximum tumble rate, and attitude characteristics of client space objects.	Yes
Interaction mechanisms	Approved capture, docking, berthing, or other physical interaction mechanisms.	Yes
Autonomy levels	Levels of on-board autonomy and required human intervention thresholds during each mission phase.	Yes
Abort and contingency procedures	Retreat, abort and safe mode procedures applicable.	Yes
Ground segment	Command and control arrangements, communication windows and latency limits.	Yes
Operator staffing and competence	Staffing arrangements, training standards and competence requirements.	Yes

Client contractual arrangements	Proposed arrangements for engagements with clients, including consent arrangements and any commercial arrangements relevant to the RPO mission.	Where known at the time of application, details of these arrangements should be provided to us. The final form of any relevant arrangements should be communicated to us once known.

How we assess the mission envelope

4.7 We assess the licence application against the full extent of the proposed mission envelope. We will look at whether the proposed mission envelope is defined in sufficiently objective, measurable and verifiable terms to enable us to assess it against the regulatory requirements. If not, we can ask the applicant to refine or adjust the proposed parameters before we complete our assessments.

4.8 Where not all client space objects or technical and operational parameters are known at the time of application, we carry out our assessments against the limits of the defined envelope. This allows the licence application to be assessed against the full range of activities that could be undertaken within those parameters, including future activities involving client space objects that have not been identified at the time of application.

4.9 Where the mission envelope includes criteria relating to the client space object, its operator, registration, jurisdiction, or other relevant characteristics, those criteria will form part of the assessed mission envelope and may limit the range of future client space objects and activities that can be accommodated within it.

4.10 After grant of the licence, any new clients (that is, client space objects that were not identified when the original mission envelope was assessed) must be notified to us in accordance with the reporting plan. Notification allows us to determine whether any further review is required, including in relation to the UK's national security, national interest and international obligations, or other considerations that could not reasonably have been assessed at the point of licence grant.

4.11 Once we are satisfied, the mission envelope is reflected in the licence, or its associated documents, and sets the parameters for what the licence covers.

Operating within the mission envelope

4.12 Licensees are allowed to carry out any activities within the scope of the licence, in accordance with its terms, conditions, conditions precedent and reporting plan

requirements. This includes requirements relating to notification of future client space objects and activities, which are discussed further in Chapter 7.

4.13 If the licensee needs to make any operational changes that are within the defined mission envelope, such as adjustments to trajectories, approach distances, phasing manoeuvres, or client configurations, it does not need to notify us beyond what is set out in the reporting plan.

Operating outside of the mission envelope – material changes

4.14 Licensees must inform us of any material change, in accordance with regulation 282 of the Space Industry Regulations. For guidance on what constitutes a material change, see paragraphs 3.16-3.19 of Working with the regulator as a licensee under The Space Industry Act 2018.

4.15 If the licensee needs to make any operational changes that are outside of the defined mission envelope, the licensee must inform us of the proposed change under regulation 282 and/or in line with their reporting plan. We will then assess whether the change engages a ground for variation under section 15 of the SIA. Licensees must not commence the proposed activities until we have confirmed our position in writing.

TMC example: mission envelope notification
In Year 3 of the TMC mission, the licensee identified a new client space object. Its characteristics were within the mission envelope, so no new regulatory assessment was required. The licensee submitted a notification, and we verified that the client fell within the mission envelope. The licensee could then plan the relevant RPO activities. By contrast, if the client space object's characteristics had been outside the mission envelope – for example, its mass or its tumble rate was outside the criteria agreed for the approved envelope – the licensee would have had to go through the material change process.

CHAPTER 5

Technical assessment

This chapter summarises the technical information that applicants must provide when applying for a space operations licence for RPO activities and how we will assess the information an applicant submits.

Safety

Regulatory basis
Our primary duty under section 2(1) of the SIA is securing public safety. Under section 9(4) of the SIA, before granting a licence, we must be satisfied that the applicant has taken all reasonable steps to reduce risks from their space operations to the health, safety and property of persons (not in a prescribed capacity) to as low as reasonably practicable (ALARP), and that the level of residual risk is acceptable.

5.1 We assess space operations licence applications individually, in the context of the mission's nature, complexity and risk. We focus on the safety outcomes applicants are trying to achieve and how well they demonstrate they can achieve them.

5.2 The TQS is the main way applicants provide the safety information we need, alongside any required supporting evidence. This enables us to make a proportionate risk-based assessment. However, where a proposed mission is particularly complex, additional safety evidence beyond the TQS may be required.

5.3 We are keen to help applicants provide the right information. So, we strongly encourage you to contact us before you apply and talk to us about your RPO mission proposals. In this pre-application phase, we can provide a range of support and guidance.

ALARP

5.4 ALARP is a central concept in UK health and safety law, widely adopted within safety engineering good practice. It requires applicants to identify and understand safety risks related to their activities, then take proportionate steps to reduce those risks so they are as low as reasonably practicable. For a detailed explanation of what ALARP means and how to demonstrate it, applicants should

refer to Appendix 1 of Guidance for Space Operations licence applicants and licensees (CAP 2210).

5.5 Whether a risk is ALARP involves a proportionate comparison between the level of risk and the cost, in money, time or trouble – the sacrifice – of measures to reduce the level of risk further. There is no prescribed methodology or tool for this.

What applicants need to demonstrate: RPO missions

5.6 Applicants must identify, assess and manage all foreseeable safety related risks arising from their activities, across both nominal and non-nominal operations. Using systematic methods for hazard identification and risk evaluation that are proportionate to mission risks, they are expected to demonstrate how those risks have been reduced to ALARP.

5.7 For RPO activities, the relevant risks for ALARP assessment are those that may directly affect the health, safety or property of persons. While the specific risks will depend on the mission, the main safety risks around RPO activities are those associated with collision, fragmentation and re-entry, such as:

- loss of control of the servicer during RPO activities
- loss of control of the combined stack
- fragmentation of the servicer or client object as a result of RPO activities
- collision between the servicer and client space object
- collision between the client space object and a trackable or non-trackable object following release or separation, and
- risks to persons and property on Earth arising from re-entry of the client space object or combined stack.

5.8 Some risks associated with RPO activities could give rise to consequential or cascading effects. For example, a collision between the RPO servicer and a client space object may generate a debris cloud that creates further collision risk for other objects. Applicants must demonstrate that they have processes in place to control and/or mitigate those consequential risks to ALARP within the time window in which those risks can reasonably be predicted or modelled.

5.9 RPO activities will often rely on the client space object operator for some information or cooperation (for example Fault Detection, Isolation and Recovery (FDIR) disabling, Global Navigation Satellite System (GNSS) telemetry sharing). Where this is relevant, applicants are expected to describe the agreed interface and how they will satisfy themselves, independently, that it is safe to commit to each phase.

TMC example: ALARP demonstration for RPO-specific safety risks

The TMC risk assessment identifies 'Servicer collides with client during RPO' as the highest-priority risk (risk factor 12). To reduce this risk to ALARP, the RPO operator considers four controls:

- phased go/no-go gates
- coordination with cooperative clients
- mission analysis, ensuring fail-safe trajectories, and
- onboard abort procedures.

The Fault Detection, Isolation and Recovery for Collision Avoidance Manoeuvrer (FDIR_CAM) function on the RPO servicer provides autonomous collision avoidance. A pre-computed avoidance manoeuvre, designed to take the servicer to a passively safe orbit for five days if a failure is detected, is uploaded before close rendezvous.

For Client 2 (non-cooperative), all go/no-go decisions must be made by the RPO servicer's Flight Director, without client operator input. To facilitate this, the RPO servicer applies pre-capture characterisation using onboard sensors (for example, Radar, Wide Angle Camera (WAC), Ultra-Wide Angle Camera (UWAC)) and confirms that the tumble rate and capture point are within its operational envelope before committing to capture.

Recognising there is also a cascading risk, the TMC addresses post-separation collision risk for Client 2 by performing conjunction screening before release and selecting the disposal orbit to minimise cross-traffic time.

Additional hardware redundancy was assessed as high cost with minimal reduction of risk and was not selected.

What applicants need to demonstrate: All space operations licensees

5.10 In addition, RPO activities involve the same general safety risks as any other space operations mission e.g. orbital, mission, such as:

- **Pre-launch and integration:** battery thermal runaway and high-energy release events; loss of containment of propellants or pressurised systems
- **Launch and early operations:** incorrect orbital insertion; dead on arrival; loss of structural capability at the interface between the servicer and its launch vehicle
- **In-orbit operations:** loss of control; risk of explosion or fragmentation from stored energy; risk of collision with other space objects
- **Re-entry and end of mission:** risks to persons and property due to re-entry into Earth's atmosphere.

5.11 Applicants must identify any such risks that are relevant to their mission and apply the ALARP assessment process to them. The above list is indicative.

Table 2: Non-exhaustive summary of what applicants need to demonstrate with regard to safety

What applicants need to demonstrate
A. That they have identified all foreseeable hazards across all mission phases, covering both nominal and non-nominal operations: pre-launch, launch and early orbit phase, transit, proximity operations, docking, servicing, separation and disposal.
B. That they have assessed the likelihood and consequence of each identified risk. (Note: We do not apply fixed numerical thresholds to orbital operations, beyond the 10^{-4} re-entry casualty risk criteria defined in the Inter-Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines, as addressed below.)
C. That they have applied appropriate technical, operational and organisational controls to each hazard with a clear explanation of why they reduce the risk to ALARP.

Space sustainability and debris mitigation

Regulatory basis
Under section 2(2)(h) of the SIA, we are required to take into account space debris mitigation guidelines issued by international organisations in which the UK government is represented. The IADC Space Debris Mitigation Guidelines provide the primary basis for our assessment of space debris mitigation. Although there is no specific legislative test for space sustainability in the SIA or Space Industry Regulations, sustainability considerations may be relevant to our assessment under over legislative tests. These include the safety requirements at section 9(4) where a sustainability issue gives rise to a foreseeable risk to persons or property, and the tests at section 8(2) relating to the UK's national security, national interest and international obligations.

5.12 The IADC Guidelines were developed for standard satellite operations and do not specifically address RPO activities. However, applicants are expected to apply them by interpretation and address RPO-specific scenarios.

5.13 The IADC Guidelines do not require assessment of client space objects as though they were under the operational control of the RPO servicer. Applicants should focus on the RPO servicer and the effects of its activities.

- Where the mission creates a hazard from a client space object following interaction, particularly where the client is non-operational, applicants should consider whether that hazard creates a foreseeable risk to persons or property. If it does, it should be addressed under the safety framework, applying the ALARP principle.
- Where the RPO mission changes the orbit of a client space object, applicants are expected to provide an analysis of the re-entry and collision risk of that object following the interaction.

5.14 In considering the IADC Guidelines, some of the identified risks overlap with the safety risks described in paragraphs 5.7 and 5.10 of this guidance. Accordingly, these overlapping risks are subject to ALARP demonstration. Instances of such overlap are highlighted in paragraphs 5.16 to 5.54 below.

5.15 Our assessment does not consider a pass or fail against the IADC Guidelines. We look at the processes, measures and justifications the applicants have put in place, and how they have approached areas where full consistency with the IADC Guidelines is not achievable.

What applicants need to demonstrate: RPO missions

5.16 Applicants must demonstrate that their RPO activities are consistent with the IADC Guidelines. While the specific risks will depend on the activities, applicants will typically need to demonstrate how the mission has been designed to limit debris generation, avoid break-up risk, conduct collision avoidance manoeuvres and dispose of the RPO servicer responsibly at the end of the mission.

5.17 For missions involving interaction with or disposal of a client space object, applicants must also address the sustainability implications of those activities.

5.18 To address these requirements, applicants are expected to set out:

- the applicable debris mitigation requirements
- means of verification and validation to assess consistency with those requirements
- a compliance matrix, and
- justifications for any areas of non-consistency.

These could be submitted as part of a Space Debris Mitigation Plan (SDMP), but applicants are not required to produce a standalone document. If applicants already have an SDMP, it does not need to be finalised at the time of application and may be versioned and progressed during assessment.

Limiting debris during RPO missions

5.19 RPO missions may involve interaction with a client space object in ways that affect its physical integrity, including component removal, disassembly, or other operations that could generate debris.

5.20 Such activities are permitted but will be assessed against the principles underlying the IADC Guidelines and recognised good practice.

5.21 The release of a non-operational client space object for disposal is not treated as intentional debris creation, nor are particulates generated during capture or docking. However, an assessment of the likelihood of unintentional debris generation should be considered where such fragmentation would give rise to a foreseeable risk to persons or property. In this case, it would therefore be subject to the ALARP assessment.

5.22 Applicants must demonstrate that the orbital lifetime, collision risk, and re-entry risk of any released items is tolerable and that the cumulative risk posed by the client and any released items is not greater following servicing than before. This demonstration can be qualitative, semi-quantitative, or fully quantitative.

Avoiding intentional destruction and harmful activities

5.23 Applicants should demonstrate through their concept of operations that no intentional destruction or harmful activities are planned and no further specific analysis beyond a narrative is required.

5.24 The re-entry of the RPO servicer and client space object as a combined stack is not considered intentional destruction of either object.

Minimising potential for break-ups resulting from stored energy – client space objects

5.25 Applicants should demonstrate that the mission has been designed to minimise the risk of causing an accidental explosive break-up of the client space object. Relevant steps could include approach trajectory design, contact force limits, an understanding of the energy stores onboard the client space object (where possible), and avoidance of actions that could trigger stored energy release.

5.26 If any of the proposed RPO activities involves disposal of a client space object, the RPO operator is not required to perform passivation of the client. Applicants are only expected to assess the probability of accidental explosive break-up of the client as far as is practicable.

5.27 Risk of explosions is also considered a safety risk and so is subject to the ALARP assessment (see 5.10).

Minimising potential for break-ups resulting from collisions – mated operations and post-release

5.28 Applicants must assess the risk of collisions throughout their proposed activities and set out appropriate mitigation measures.

5.29 This should include assessing the risk of collision of the combined stack during mated operations.

5.30 If the RPO mission involves the release of a client space object, pre-release conjunction screening should be performed, or other functions implemented to ensure the safety of the client space object in the period after release.

5.31 If a parking orbit is to be used, applicants should demonstrate that operating the RPO servicer in that orbit for the planned duration does not give rise to unreasonable collision risk with both trackable and un-trackable space debris.

5.32 If the exact orbits to be visited are not fully defined at the time of application, for example where not all client space objects are known, applicants should provide an estimate of collision risk based on a target mission plan and describe the methodology used.

5.33 Risk of collisions is also considered a safety risk and so is subject to the ALARP assessment (see paragraph 5.7).

Post-mission disposal and re-entry – client space objects

5.34 For RPO activities involving disposal of a client space object in Low Earth Orbit (LEO), applicants should set out a disposal plan as part of an end-of-life plan. The plan is expected to include an assessment of the client space object's orbital lifetime, collision risk and re-entry risk following release.

- For missions in Geostationary Orbit (GEO), the resulting orbit of the client space object is subject to the same IADC constraints as the RPO servicer.
- For missions in other orbital regions, the disposal orbit of the client space object should follow similar principles.

5.35 The applicant should ensure that disposal from all orbits within the mission envelope are considered in their end-of-life plans, including from the parking orbit if no further servicing activities are possible.

5.36 Where released client objects create a foreseeable safety risk to persons or property, that hazard is also subject to the ALARP assessment.

5.37 Where the combined stack could foreseeably re-enter while still joined, the applicant should include analysis of the re-entry risk of the combined stack.

5.38 Re-entry risk is also considered a safety risk and so is subject to the ALARP assessment (see paragraph 5.7).

TMC example: Considering and meeting post-interaction disposal obligations
The TMC examined three different disposal scenarios for the three different space objects. **Client 1 – orbit change:** The inclination change by the RPO servicer at 800 km modified Client 1's disposal profile. The owner/operator of Client 1 confirmed the end-of-life plan remained compliant with the new inclination. **Client 2 – pre-release conjunction screening:** The RPO servicer placed Client 2 into a rapidly decaying orbit (natural decay <5 years per analysis performed in DRAMA/OSCAR) selected to minimise collision risk following separation. This was fully confirmed by the joint parties before the release of Client 2. **Client 3 – combined stack re-entry:** The stack was nominally targeted for controlled re-entry to the SPOUA. Debris Risk Assessment and Mitigation Analysis (Spacecraft Atmospheric Re-entry Analysis (SARA)) analysis confirmed the re-entry casualty risk was within the 10^{-4} threshold. In a disposal failure scenario, the TMC addressed the uncontrolled re-entry risk by using electric propulsion to lower altitude as far as possible before passivation, demonstrating that the weighted probability of that scenario kept the overall casualty risk within acceptable limits.

What applicants need to demonstrate: All space operations licensees

5.39 RPO missions involve the same general sustainability requirements as any other orbital mission. The most relevant requirements are set out below. All apply across mission phases for both the RPO servicer and any combined stack.

Limiting debris released during normal operations

5.40 RPO missions are expected to be designed to avoid release of debris. Where this is not feasible, applicants should provide a justification and demonstrate all steps they have taken or will take to minimise the impact of debris release.

Avoiding intentional destruction and other harmful activities

5.41 Applicants should demonstrate that no intentional destruction or harmful activities are planned. No specific analysis is required.

Minimising potential for break-ups resulting from stored energy

5.42 Missions should be designed so that no single probable failure mode leads to accidental explosive break-up.

- Where probability analysis data is available, applicants should demonstrate that the probability of accidental explosive break-up is less than 10^{-3} over the operational lifetime.

- Where such data is not available, applicants should demonstrate that monitoring, anomaly detection and resolution processes are in place to manage the risk to an acceptable level.

5.43 If the mission does not involve a controlled re-entry, applicants should include passivation of the RPO servicer in their end-of-life plan. If full depletion of energy sources is not achievable, applicants should justify why and demonstrate the residual risk is tolerable.

5.44 Risk of explosions is also considered a safety risk and so is subject to the ALARP assessment (see 5.10).

Minimising potential for break-ups resulting from collisions

5.45 Applicants should assess the risk of collision with trackable and un-trackable debris, as part of demonstrating they understand the risks associated with the selected orbital region. They should estimate the probability of collision with known trackable objects during the mission lifetime and use this to inform appropriate mitigations, for example by including a collision avoidance capability.

5.46 Applicants should demonstrate that they have established procedures for conjunction monitoring, assessment and mitigation, including manoeuvre coordination with other operators, and identify the Space Situational Awareness (SSA) providers they will use. We do not prescribe specific quantitative thresholds for collision probability triggering a mitigation action or expected post-mitigation residual collision probability.

5.47 Requirements relating to trackability enhancement features apply only to smaller satellites or objects that may not be easily tracked in the target orbital region (for example, space objects smaller than 1U CubeSat form factor in LEO, or with apparent dimensions below 50 cm in higher orbits.) Applicants operating larger space objects are not required to address trackability as part of their space debris mitigation plans unless other characteristics of the space object or mission would make it difficult to detect, track or reacquire.

5.48 Risk of collisions is also considered a safety risk and so is subject to the ALARP assessment (see paragraph 5.7).

Post-mission disposal (PMD)

5.49 Applicants should set out their end-of-life plan for disposal of the RPO servicer at end of mission and describe how they will ensure they have sufficient propellant and resources to execute it.

- For LEO missions, disposal should target re-entry as soon as is practicable and within no more than 25 years.
- For GEO missions, the RPO servicer should transfer to a disposal orbit that meets the IADC altitude and eccentricity constraints.

- For other orbital regions, applicants should adopt responsible disposal practices that minimise long-term debris presence in valuable orbits.

5.50 We recognise it is difficult to demonstrate the probability of successful PMD. Where reliability data is limited, a qualitative demonstration is acceptable, provided applicants can show that any single-point failures relevant to PMD have been identified and addressed, and that appropriate operational practices are in place to minimise the risk of a permanent failure preventing PMD.

Re-entry risk

5.51 For missions where disposal will be through atmospheric re-entry, applicants must assess re-entry casualty risk. If the risk is at or above 10^{-4}, applicants should identify ways to reduce it. Below this threshold, applicants may be asked to justify why it cannot reasonably be reduced further.

5.52 Re-entry analysis based on the nominal disposal scenario is sufficient unless the casualty risk is close to 10^{-4}, in which case applicants may be asked to assess foreseeable off-nominal scenarios.

5.53 If the applicant plans a controlled re-entry, the system design should include functions that will enable prediction of re-entry time and trajectory. It should also detail how it will report to the National Space Operations Centre (NSpOC).

5.54 Re-entry risk is also considered a safety risk and so is subject to the ALARP assessment (see paragraph 5.7).

The technical assessment framework

5.55 The TQS is designed to help us obtain the detailed information we need about proposed spaceflight activities to make informed licensing decisions. This section of Chapter 5 provides an overview of the key topics within the TQS and how they form a clear assessment framework.

5.56 First, applicants are asked to provide a comprehensive overview of the space system (launch, space and ground segments) and concept of operations across all mission phases. This overview provides the necessary context to determine the scope, depth and proportionality of the assessment.

5.57 The process then evaluates whether the applicant has adequately identified and assessed risk arising from their proposed operations, and whether they have taken the necessary technical, operational, and organisational controls to prevent and mitigate those risks to ALARP.

Mission overview and context

5.58 Applicants must provide enough context for us to understand the operations that would be carried out and the risks that could arise. To enable this, the overview should include:

- a description of the concept of operations
- details of the space object the applicant intends to operate in orbit
- how the chosen launch operation has been planned to minimise risk to public safety and the orbital environment, and
- the role of ground-based elements in ensuring safe operations during all mission phases.

5.59 Applicants are expected to summarise their previous experience of operating space objects and how this experience has influenced their assessment and management of risk.

Hazard identification and risk evaluation

5.60 Applicants are expected to identify the potential hazards that could arise at all phases of the operations from deployment on orbit to end-of-life disposal. This should cover not only hazards within nominal operations but also all foreseeable non-nominal operations.

5.61 It is up to the applicant how they demonstrate they have done this. They can provide evidence across multiple documents: there is no expectation to produce a single hazard log or a dedicated risk assessment. The priority is that the method used is appropriate for their operations and based on experience of the people involved. Applicants should describe the method used and justify why it is appropriate, with evidence that a broad range of suitably qualified and experienced people were involved.

Methods that can be considered include Hazard Identification (HAZID), Failure Modes and Effects Analysis (FMEA), Failure Modes Effects and Criticality Analysis (FMECA) and ‘What-If’ analyses, alongside an SDMP, Design Description or System Safety Reports.

5.62 For each identified hazard, applicants should demonstrate that all reasonably practicable controls have been identified and applied and explain why nothing more could reasonably be done to reduce the risk further.

5.63 There is no requirement for fully quantitative analysis, but applicants are expected to show at least a qualitative or semi-quantitative understanding of the likelihood of identified hazards occurring and the assumptions underlying that assessment.

In-orbit operations

5.64 Applicants should explain the plans, procedures, rules and criteria they will put in place to ensure safe operations during all mission phases, how these plans have been developed and tested, and how they will be adhered to. The explanation should address nominal and all foreseeable non-nominal operational events,

including anomaly management procedures covering detection, alerting, response and resolution.

5.65 Applicants should also describe:

- the onboard automated response, safe and recovery modes they propose to use and how these have been developed and tested, and
- how operator competence is achieved and maintained through training and assessment.

RPO servicer and safety-critical systems

5.66 Applicants should provide a technical description of the RPO servicer, describing the functional and performance specifications of the system, sub-systems and units. This should include appropriate design standards, functionality and capability during all mission phases and how the technical specification was developed from validated top-level mission requirements. Details of safety-critical systems, including redundancy provisions and verification status, should be included.

5.67 Applicants are expected to identify which systems and functions are safety-critical for their mission and demonstrate that these have been designed, tested and verified to an appropriate standard. For RPO missions, safety-critical functions typically include:

- redundancy in systems required to perform abort or retreat functions, including propulsion and GNC
- relative navigation and GNC performance across the full approach envelope, including under off-nominal conditions
- onboard abort logic, including trigger conditions, abort manoeuvre design, and the point of no return before capture
- safe hold and recovery modes, and how these have been developed and tested, and
- safety zones and keep-out volumes during proximity operations, and how violations are detected and responded to.

5.68 For RPO activities involving non-cooperative client space objects, applicants should describe the characterisation data required before they commit to the approach, and explain what happens if that data is unavailable or outside expected mission envelope parameters.

Ground segment and operations

5.69 Applicants should describe how the ground segment has been developed to meet mission requirements across nominal and foreseeable non-nominal

scenarios. This should address staffing arrangements, operator qualifications, and how procedures are developed, tested, rehearsed, and subject to performance review and continuous improvement.

Launch segment

5.70 Applicants should demonstrate how their chosen launch operation has been planned to minimise risk to public safety. This should cover the period from arrival of the RPO servicer at the launch site through to deployment on orbit.

5.71 Where hazardous launch preparations are required, applicants should demonstrate that all foreseeable hazards have been identified and that the risks have been controlled and mitigated. For dedicated launch operations, applicants should demonstrate that appropriate due diligence has been conducted on the launch operator’s safety practices.

CHAPTER 6

Regulatory assessments

This chapter summaries the additional regulatory and governance information that is, or may be, required when applying for a space operations licence for RPO activities and how we will either assess the information an applicant submits, or otherwise gather it.

Direct and Effective Control (DEC) and responsibilities during a joint RPO mission

Regulatory basis
The scope of "space activity" in the UK is set out in section 1 of the SIA and includes: operating a space object, any activity in outer space, and return to earth of a space object. The legislation does not define the term "operating". However, subsection 1(2) of the SIA provides that a person "carries out a space activity or suborbital activity if the person causes it to occur or is responsible for its continuing". This is an important proviso since it indicates the person's ongoing responsibility for the space object at all times and for decision-making about how the space object is used. A person operating a space object under UK law – specifically, the SIA and Space Industry Regulations – must only do so under the authorisation of a licence (section 3 of the SIA) and remains subject to the SIA and Space Industry Regulations, including any conditions put on the individual space operations licence. As outlined in paragraph 1.8, where appropriate we intend to apply the same Direct and Effective Control principles described in this Chapter when considering applications for OSA space operations licences.

What is direct and effective control?

6.1 If various parties are involved, we apply the concept of Direct and Effective Control (DEC) to determine who the 'operator' of a space object is, in terms of who needs a licence and bears responsibility under the licence's terms and conditions for the licensed activity.

6.2 To exercise DEC, a UK entity must:

- have access to the technical means of operating the space object at all times (these may be held in-house or contracted out to third parties), and

- have final authority over the operation of the space object, which cannot be overridden by a third party (other than the UK regulator).

6.3 The UK entity that meets these criteria is understood to be the operator. This is also the case on occasions where having access to the technical means of operating the space objects could rely on those technical means being temporarily supplied by the RPO partner, via its space object.

6.4 The concept of DEC recognises the complex nature of space object operations and allows for the technical aspects of controlling a space object to be carried out by one or more additional parties, as long as ultimate authority remains with the licensee.

Agreements concerning the role each party will play in an RPO operation

6.5 As different parties may be involved in operating a space object, we as the regulator need to understand:

- who each of these parties are, and
- what their roles will be.

6.6 Such arrangements may be formalised in a contract between parties (sometimes in the form of an Operational Control Agreement or equivalent), setting out the responsibilities and services to be provided by each party during a joint mission. These contracts or agreements are important for the grant and monitoring of a licence, so need to be submitted to us.

- If the client space object is known at the time of application, any such agreement should be submitted to us as part of the application. We will need to assess its implications before deciding whether to grant a licence.
- If a licence is granted on the basis of a mission envelope and client space objects are not yet known at the time of application, the agreement should be submitted to us before operations with each client commence. We will need sufficient time to review it before the licensee can begin those operations.

6.7 The agreement should set out the legal relationship between the various parties and show how the UK applicant/licensee intends to meet the DEC criteria.

Responsibilities during a joint mission involving a UK RPO servicer and a non-UK client space object

6.8 For a joint RPO mission between a UK RPO servicer and a non-UK client space object, only the RPO servicer will need a UK licence. However, the non-UK operator, if a commercial organisation, is likely to require an authorisation or similar from its own nation State.

6.9 Broadly, our expectations for a joint international RPO mission are that:

- both States will continue to bear international responsibility for their national space activities, and the respective space object operators will be under the authorisation and continued supervision of their individual States at all times
- the State of registration of each space object will retain jurisdiction and control over their respective space objects and the operators at all times
- RPO missions jointly undertaken by a UK licensee and an operator from another State must be undertaken cooperatively; for the purpose of mutual assistance; and with due regard to the interests of each respective State, and other third-party States
- the nature and conduct of the joint RPO activity could not in any way be construed as potentially harmful interference with the space activities of another State
- the implications of the joint RPO activity have been considered in relation to Article VII of the Outer Space Treaty 1967 (OST) concerning a launching state's international liability for damage and the subsequent UN Liability Convention 1972.

6.10 These expectations apply particularly during mission phases where both objects are in close proximity or physically joined together, if that is necessary for a service to be supplied or an activity performed.

6.11 Even where these provisions are met, we may need to consider additional factors on a case-by-case basis. This is particularly the case for any missions that appear to have implications for the UK's national security or national interest, or for which suitable arrangements for apportioning liability need to be determined. The additional factors to be considered will depend on the particular requirements of other States involved. Potential additional requirements could include:

- an overarching co-operation agreement, including statements of consent, between the UK and the other participating State
- particular forms of insurance or arrangements to cover indemnity amounts
- cross-waivers of liability between the RPO participants.

6.12 We will liaise with the relevant UK government department to determine whether any existing bilateral or multilateral arrangements or agreements apply to the proposed RPO mission and whether they give rise to any additional requirements.

6.13 Applicants and licensees should also be aware of other potential complexities that we may investigate further in relation to individual missions. These could include:

- if the non-UK State is not a signatory to the OST and UN Conventions (Liability Convention 1972 and Registration Convention 1975)
- if we have any concerns about the non-UK State's authorisation process for spacecraft operators
- where the State with jurisdiction and control over the space object needs to be clarified
- if any transfers of jurisdiction are expected to be made prior to the mission or during the mission
- whether the mode of operation during combined (physically connected) activity allows the UK licensee to fulfil its OST obligations
- whether there is a written inter-operator agreement for the joint mission that sets out the legal status of the parties in terms of each parties' national jurisdiction and the jurisdiction that will apply if legal disputes need to be settled, and
- if deemed necessary, the existence of an appropriate form of consent for participation by either the two operator(s) or the State with jurisdiction over the relevant space objects.

The exercise of DEC during a joint RPO space activity

6.14 The UK concept of DEC allows for temporary exchanges of technical control between operators of space objects, with both parties retaining ultimate authority and responsibility for their space activity.

6.15 In cases of joint RPO missions where docking is required to carry out the mission, this is likely to consist of the RPO servicer having pre-agreed physical and possibly other forms of technical control over the client space object for temporary periods.

6.16 As a potential consequence of certain kinds of RPO missions, in the docked configuration it may not be possible for the client to resume full technical control or functionality at particular points in time, as this could hinder or prevent the servicing operation then in progress. The form of ultimate authority may therefore take the form of pre-planned joint mission rules and other protocols for each stage of the joint activity, with established criteria for consent to commence, continue or terminate any conjoined phase, and for off-nominal situations.

6.17 Both parties to the RPO mission will need to have jointly assessed and accepted the risks of the activities in the docked configuration before they are commenced. In broad terms, these risks are the potential damage to each other but also to third-party objects and the space environment. Ideally, parties will agree cross-waivers of liability for damage between themselves i.e. non-third party, for close proximity and docking phases.

International obligations

Regulatory basis
Under section 2(2)(g) of the SIA, we must exercise our functions in a manner that is best calculated to take into account the UK's international obligations. Under section 8(2)(b) of the SIA, before granting a licence, we must be satisfied that doing so is consistent with the international obligations of the UK. Relevant international obligations include the UK's obligations under the OST, Liability Convention 1972 and Registration Convention 1975, but may also include relevant bilateral or other agreements entered into by the UK government.

6.18 We will assess whether the proposed RPO mission is consistent with the UK's international obligations on the basis of the TQS and supporting documentation submitted as part of the licence application.

6.19 Whilst RPO activities do not, in themselves, trigger an obligation on the UK to conduct formal consultations with other States under Article IX of the OST, UK government policy is to encourage the sharing of information internationally regarding planned space activities including RPO. Information may be requested for these purposes, in addition to supporting the UN Registration processes. Accordingly, we will engage with relevant government departments to assess whether any specific mission profile gives rise to consultation obligations, on a case-by-case basis.

Security

National security

Regulatory basis
Under section 8(2)(a) of the SIA, we may only grant a licence if we are satisfied that doing so will not impair the national security of the UK. We also have the duty under section 2(2)(f) of the SIA to take into account the interests of national security when exercising our spaceflight functions.

6.20 RPO missions do not automatically give rise to national security concerns. However, UK national security must still be considered in any application. RPO activities, including close-approach, characterisation and physical interaction with a third-party space object, can provide an opportunity to gain information about that object's design, capabilities, vulnerabilities, behaviour or status. Because of these characteristics, national security considerations may arise more frequently

in RPO missions than in standard space operations. The following factors may indicate an RPO mission raises national security considerations:

- the technologies involved: including whether they provide access to or generate sensitive or classified information including those related to radio frequency emissions
- the nature and purpose of the service: RPO missions carrying out inspection or characterisation of another space object may raise national security concerns, depending on the target and the data generated
- the characteristics of the customer and client space object, including:
    - the nature of the customer entity (public or private sector, military affiliation, nationality, and ownership structure)
    - the identity of the direct beneficiary of the service, where this differs from the contractual customer, and
    - information that allows us to distinguish who the launching State is and who is the State of jurisdiction and control of the client space object (if these are not the same).

6.21 All space operations licence applicants must complete a National Security Assessment Questionnaire. For RPO missions, the questionnaire is also expected to cover client-specific information including the identity, nationality, ownership and nature of each client and its operator. It is reviewed by the UK Space Agency, which coordinates with the National Cyber Security Centre (NCSC), National Protective Security Authority (NPSA) and Ministry of Defence (MoD) as appropriate. If an RPO operator proposes to engage a new client, we may require an updated National Security Assessment Questionnaire following notification to reflect the characteristics of the new client.

6.22 Applicants are encouraged to raise any potentially sensitive aspects of the mission during the pre-application stage and to share information on prospective clients as early as possible, both during the pre-application stage and when negotiating with any new clients after the licence has been granted, including:

- the type of service
- the identity and State of Registry of the client space object, and
- the launching State and/or the State of jurisdiction and control.

6.23 Client identity, ownership structure and business profile are relevant to the national security assessment.

Security manager

6.24 Where the national security assessment identifies a security concern, under regulation 10, applicants are required to appoint a security manager as a condition of the licence.

6.25 The security manager must also develop and maintain a space site security programme for the mission management facility. The programme must be site-specific, proportionate to the RPO mission, based on an up-to-date risk assessment, and reviewed at least every 12 months.

For more details on the responsibilities of a security manager, see regulations 169-170 of the Space Industry Regulations.

6.26 The security manager is a prescribed role under the Space Industry Regulations. The same individual may hold the roles of security manager and accountable manager concurrently.

6.27 The security manager must hold a minimum Baseline Personnel Security Standard (BPSS) clearance before appointment and apply for Counter-Terrorist Check (CTC) clearance, or higher as appropriate. Further information is set out in Guidance on security matters for applicants and licensees (CAP 2217).

Physical, personnel and cyber security

Regulatory basis
If a licence is granted, part 11 of the Space Industry Regulations requires all licensees to maintain appropriate physical, personnel and cyber security. These are ongoing obligations throughout the licensed activities. Further guidance is set out in Guidance on security matters for applicants and licensees (CAP 2217) and Guidance on Cyber Security Strategies for applicants and licensees (CAP 2535).

Physical and personnel security

6.28 Physical and personnel security requirements apply at space sites, such as the mission management facilities from which RPO activities are controlled. Licensees must ensure these facilities are secure from unauthorised access. Where a security manager has been appointed, the measures taken to protect against unauthorised access should be set out in the space site security programme.

6.29 Security measures are expected to be proportionate to the sensitivity of the operations, taking into account the nature of the mission, the information handled, and whether any restricted areas have been designated.

Cyber security

6.30 Applicants must submit a draft cyber security strategy and the underlying cyber security risk assessment covering the network and information systems used for their RPO mission, as stipulated in regulation 185 of the Space Industry Regulations. The strategy must align with Guidance on Cyber Security Strategies for applicants and licensees (CAP 2535) and demonstrate that the applicant has:

- identified all critical information systems and services used to support the RPO mission
- performed a risk assessment that considers how cyber incidents could affect the safety and security of operations, and
- selected and implemented proportionate protective measures to reduce risks.

6.31 For RPO missions, the cyber security strategy should cover as a minimum:

- all ground segment systems used for command and control of the RPO servicer
- communications links between the ground segment and the RPO servicer, including the integrity and, where appropriate, confidentiality of data exchanged
- mission planning and flight dynamics systems
- any systems used by third parties, including clients, that interface with the RPO operator's command and control architecture, and
- risks related to inspection or servicing data that may be commercially or nationally sensitive, including how it is handled, stored and transmitted.

6.32 The cyber security strategy is expected to address the specific risks arising from the remote, automated and time-critical nature of RPO. In particular, it should address the risk that a cyber incident could affect the ability to conduct collision avoidance manoeuvres, execute abort procedures, or maintain control of the RPO servicer during proximity operations.

6.33 We assess the cyber security measures for systems under the direct control of the RPO operator, including both space segment and ground segment. Client operator systems are not in scope. However, applicants are expected to agree shared cyber security protocols with contracted clients for any shared interfaces and describe these in the strategy.

Reporting requirements for cyber security incidents

6.34 Applicants must report any notifiable security incident to us within 72 hours of becoming aware of it, in accordance with regulation 186 of the Space Industry Regulations. A notifiable incident is any event that has an adverse effect on the security of the network and information systems used in relation to the RPO mission and that may have a significant impact on future essential services.

Liability, indemnity and insurance

Regulatory basis
RPO missions are subject to the same international and domestic indemnity, liability and insurance framework as all other space operations licensees under the SIA and Space Industry Regulations, as amended by the Space Industry (Indemnities) Act 2025. This framework derives from the UK's international space obligations under Article VII of the OST and the provisions of the Liability Convention 1972. The general framework is described in detail in Guidance on liabilities and insurance (CAP 2218), which sets out the relevant legislative background and requirements. Future updates to CAP 2218 may reflect changes to the UK's approach to determining operator liability limits for UK-licensed space operations, including RPO missions. To support the development of this emerging sector, the UK government has announced that third-party liability and insurance requirements will be waived for in-orbit servicing, assembly and manufacturing and lunar missions launched before 2030. This policy aligns with a recommendation from the RPO Regulatory Sandbox, and it will apply to licences issued from 1 December 2026 for such missions. It will apply only for the orbital operations phase of the mission; the existing liability and insurance requirements associated with the launch phase of the mission will continue to apply. Each space operations licence issued for an RPO mission within the timeframe set out above, will contain liability and indemnity conditions, set at £ zero, whether they are issued under the SIA or OSA, and will not contain requirements for operators of such missions to hold third-party liability insurance coverage.

Commercial agreements between parties (reciprocal waivers of liability)

6.35 RPO space operations licensees and their clients may enter into contractual agreements that establish cross-waivers of liability and indemnity, allowing the parties to agree to allocate risk and liability for one or more phases of the mission. The allocation of liability may differ between mission phases: applicants should consider how their commercial agreements and insurance arrangements address transition points, particularly at docking and separation.

Liability sharing arrangements

6.36 The UN Liability Convention 1972 establishes that when multiple States participate in a joint launch, they are held jointly and severally liable for damage caused to third parties. In cases where the RPO servicer and client space objects are operating under different jurisdictions, the UK government may enter into formal bilateral or multilateral arrangements and agreements to facilitate RPO missions. These arrangements may include principles around liability sharing for such missions, to provide further clarification to the requirements set out in the Liability Convention.

6.37 It is anticipated that such arrangements or agreements will not need to be renegotiated for each mission, but additional points may need to be agreed for further missions.

6.38 We will engage the relevant UK government departments to determine whether any bilateral or multilateral arrangements apply to the proposed RPO mission.

6.39 Formal bilateral or multilateral arrangements will not normally be required before a RPO mission can be licensed. However, another jurisdiction involved in the mission may require such arrangements before the mission can proceed. Potential applicants for a space operations licence should therefore engage with us at an early stage where such requirements may arise, as they could affect mission timelines.

[Note: it is expected that the UK government's announced waiver on UK licensees would continue to apply under such arrangements, unless otherwise advised.]

Identification of launching States for servicing and client objects

6.40 Under the OST and the Liability Convention, international liability for damage caused by a space object to persons or property of another State is linked to the launch of that object.

6.41 As part of the assessment of the liability implications arising from the RPO mission, we will identify the launching states for the other object(s) involved in the mission and determine, alongside the UK government, whether further engagement is needed with the launching state(s) of the space object that has applied for a UK licence.

6.42 Responsibility for engaging with launching states identified rests with us and the UK government, not with applicants or licensees. However, applicants will be asked to provide details of any launching states for the space objects involved in the proposed mission to assist with this process.

Consent of client operators and relevant states to the RPO mission

6.43 For RPO activities, the operators of the space objects involved, and the relevant State authorities must consent to the RPO activity taking place.

6.44 Applicants must provide evidence that the client operator has consented to its space object being involved in an RPO mission.

6.45 Where an operator of a space object cannot be identified, applicants must provide evidence that the State with jurisdiction over the space object has consented to it being involved in an RPO mission, e.g. where the object is a discarded rocket, abandoned satellite or other object regarded as debris, and the client is the State.

6.46 Where the space object is still being actively operated, we will also check that the relevant authorisations are in place from the client operator's jurisdiction to enable the mission to be conducted.

Licence conditions

Regulatory basis
Under section 13 of the SIA, when we grant a licence, we can make it subject to conditions of the kinds described in Schedule 1 of the SIA, as well as any other conditions we consider appropriate. Conditions may be varied, added, removed or suspended under section 15 of the SIA. Failing to adhere to a condition of the licence is an offence under section 13(8).

6.47 A space operations licence granted for RPO activities will include the standard conditions listed in Appendix 2 of Guidance for Space Operations licence applicants and licensees (CAP 2210). However, it will also include additional or modified conditions to reflect the RPO mission and mission envelope, including an indemnity limit. The licence will also include a reporting plan.

6.48 If the licensed activities could give rise to a national security issue, there will also be a condition requiring the appointment of a security manager.

6.49 In addition to the standard space operations licence conditions, a space operations licence for an RPO mission will typically include the following RPO-specific conditions:

Table 3: Typical licence conditions that could apply to RPO activities

Condition	Explanation
Mission envelope	Confirms that RPO activities may only be carried out within the assessed mission envelope parameters. The condition describes or references the envelope parameters.
Envelope amendments	Requires the licensee to notify us of any proposed amendment to the mission envelope. Amendments must not be implemented until we have confirmed in writing that they may proceed. Substantial amendments or material changes require a formal licence variation under section 15 of the SIA.
Named clients	Identifies the client space objects that were individually assessed at the point of licensing, or whose parameters formed part of the mission envelope.
Notification of new clients	Requires the licensee to notify us before commencing RPO with any client not individually named in the licence. Notification allows us to determine whether any further review is required, including in relation to national security, national interest and international obligations, that could not have reasonably been assessed at the point of licence grant. Such matters may require consultation with relevant government departments before we determine our position. RPO activities with new clients must not commence until we have responded to the notification.
Joint operations	Where the mission involves joint operations with a client operator, the licence will reflect the arrangements under which another operator may operate the licensee's space object as part of a joint activity.
Agreements between the parties to the joint RPO activity	Refers to any agreements between the parties to the joint RPO activity. Such agreements may include agreements on service provision; operational control; cross-waivers of liability, etc. Where the client is known at the time of licence application, any such agreements must be provided at application stage. Where clients are identified post-licence, the agreements must be provided before RPO with that client commences.

6.50 Additional conditions may be imposed depending on the specific mission profile. These will be identified during the assessment and consulted on with the applicant before the licence is granted.

CHAPTER 7

Ongoing monitoring, reporting and licence variation

Regulatory basis
Under section 26 of the SIA, we are responsible for monitoring all licensed activities to ensure they are compliant with the SIA; the Space Industry Regulations; the conditions of the licences; the UK's international obligations, and to protect public safety and national security. This chapter explains how we discharge that duty in respect of space operations licenses for RPO missions. It should be read alongside Working with the regulator as a licensee under the Space Industry Act 2018 (CAP 2214), which sets out our general approach to monitoring and enforcement across all licence types.

The reporting plan

7.1 All space operations licences include a reporting plan, developed during the licensing process. The reporting plan sets out what information licensees must provide us and when in the mission lifecycle it must be provided. The reporting plan is based on our assessment of the licence application and takes into account the following:

- the nature of the RPO mission
- its duration
- the number and the complexity of the RPO activities, and
- the level of oversight appropriate to the mission's risk profile.

7.2 Adherence to the reporting plan is a licence condition.

7.3 For RPO missions, the reporting plan will typically include the following reporting requirements, in addition to any requirements applicable to all space operations licensees (see Guidance for Space Operations licence applicants and licensees (CAP 2210)):

- confirmation of launch date and orbital insertion parameters, where these were not available at the time the licence was granted
- a status report on completion of the launch and early orbit phase (LEOP), confirming the RPO servicer's orbital parameters and operational status before RPO activities commence
- advance notification of RPO activities involving a client space object identified after the licence was granted

- a status report following conclusion of each distinct phase of RPO activities, confirming the outcome of those activities, the current state of the RPO servicer and, where relevant, the client space object, and any material differences from the mission envelope. What constitutes a distinct phase of RPO activities for the purposes of the reporting plan will be defined by reference to the concept of operations submitted at licence application.

7.4 Where the mission envelope approach has been used, the reporting plan will also include the notification process for previously unknown clients or RPO activities.

7.5 The reporting plan is not a mechanism for us to participate in the licensee's operational decision making. Our interest is in being kept informed of mission progress at the points identified within the reporting plan.

7.6 We will not usually introduce additional reporting requirements during the operational phase of the mission beyond those set out in the reporting plan, unless exceptional circumstances arise such as a reportable occurrence that reveals a fundamental shortfall in the licensee's safety or operational practices.

7.7 In addition to the reporting plan, licensees must fulfil their occurrence reporting obligations under part 16 of the SIA and any other reporting requirements set out in the Space Industry Regulations.

Notifying us of new clients or RPO activities

7.8 Licensees whose licence covers named clients only, and who want to add a new client, must apply for a variation under section 15 of the SIA. Unlike the mission envelope approach, the proposed activities relating to the new client will not previously have been assessed against the legislative tests applicable to the licence and may therefore require further regulatory assessment.

7.9 Licensees who defined a mission envelope and are now ready to specify a new client space object, or other specific details of activities that fall within that mission envelope, must inform us before starting those activities. The notification should include sufficient information to allow us to verify that the proposed client and activities fall within the assessed mission envelope.

7.10 Notification allows us to determine whether any further review is required, even where the proposed client and activities fall within the mission envelope. Any such review is likely to focus on matters relating to national security, national interest and international obligations that could not reasonably have been assessed at the point of licence grant.

7.11 Those activities must not commence until we have confirmed in writing that they may proceed. We aim to inform the licensee of the outcome of our initial review within the timeframe set out in the reporting plan.

7.12 If the client space object is outside the mission envelope, the licensee must inform us under regulation 282 of the Space Industry Regulations. A licence variation may be required if the proposed change engages any of the grounds under section 15 of the SIA and therefore requires a regulatory assessment of the proposed change. The scope of that assessment will be proportionate to the nature and extent of the change; it is not a reassessment of the licence as a whole. We will confirm what information is required to assess the variation.

Table 4: Review outcomes following notification

Outcome	Meaning and next steps
Confirmed within envelope	The client characteristics fall within the mission envelope parameters, and the proposed activities are consistent with the basis on which the licence was granted. RPO activities may proceed.
Further information required	We need additional information to complete the verification. The review period is suspended until that information is received.
Outside the envelope	The client characteristics fall outside the mission envelope parameters. Licensees should inform us of a material change under regulation 282 and we will consider whether further regulatory assessment is required or a licence variation, under section 15 of the SIA, before those activities may commence.

ANNEX A

Key definitions

The following definitions apply in this guidance. The Annex sets out definitions for RPO specific terms and for general space operations licence terms that are central to understanding this guidance. It is not exhaustive and further terms applicable to space operations licensing can be found in CAP 2210 and the SIA and Space Industry Regulations.

As Low as Reasonably Practicable (ALARP)	A central concept in UK health and safety law. It requires applicants to identify and understand safety risks related to their activities, then take proportionate steps to reduce those risks so they are as low as reasonably practicable.
Attitude and Orbit Control System (AOCS)	A system commonly deployed on satellites to control their orientation.
Client Space Object	The space object being serviced by the RPO servicer.
Concept of Operations (CONOPS)	A description of how a space operations mission will be planned, executed and managed across all phases. We review this as part of our licence assessment.
Cooperative Client Space Object	Refers to a client space object which is operational and able to provide telemetry and can be commanded to facilitate RPO activities, e.g. by changing and maintaining attitude.
Direct and Effective Control (DEC)	Refers to the entity which has access to the technical means of operating the space object at all times, and has final authority over the operation of the space object, which cannot be overridden by a third party (other than the UK regulator).
End-of-life	When a spacecraft or launch vehicle orbital stage: a) is permanently turned off (nominally as it completes its disposal phase) b) re-enters the Earth's atmosphere, or c) can no longer be controlled by the operator.

End-of-life plan	A plan submitted to us detailing how the licensee intends to dispose of their space object
Fault Detection, Isolation and Recovery (FDIR)	A process for detecting faults and accurately isolating them to a failed component in the shortest time possible
Geostationary Orbit (GEO)	An orbit that follows the Earth's rotation.
Global Navigation Satellite System (GNSS)	Any satellite constellation that provides global positioning, navigation, and timing services.
Low Earth Orbit (LEO)	An orbit at an altitude of less than 2000 km.
Life Extension	An approach designed to keep satellites operational in orbit for longer.
Mission Envelope	The parameters within which RPO activities will be conducted.
Non-Cooperative Client Space Object	Refers to a client space object that cannot be controlled to facilitate RPO activities.
Non-Operational Client Space Object	A client space object that has no functionality. This could include an object that is now regarded as space debris.
Space Operations Licence	A type of licence granted under the SIA for purposes such as the operation of a satellite or other space object from the UK.
Operational Client Space Object	A client space object that retains full or partial functionality, under the control of the client space object operator.
Parking Orbit	A temporary orbit, used for a specific purpose, when the space object does not move, or only moves a small distance.
RPO	Rendezvous and proximity operations – a category of space activities, during which one space object intentionally approaches, manoeuvres in close proximity to, interacts with, or physically engages with another space object. A common reason is to service the space object that is already in Earth orbit.
RPO Servicer	A space object designed to provide RPO services to client space objects.

Space Debris Mitigation Plan (SDMP)	A document that describes how an operator will mitigate the risks of space debris being generated in its activities.
Space Industry Act 2018 (SIA)	A UK government Act of Parliament that makes provision to regulate all spaceflight activities carried out from the UK.
Space Industry Regulations 2021	Regulations under the SIA that enable the licensing and regulation of spaceflight activities, spaceports and range control services.
Sun-Synchronous Orbit (SSO)	A type of polar orbit that matches the Earth's rotation around the Sun. A space object in SSO always appears in the same position relative to the Sun.

ANNEX B

Related CAA publications and legislation

This guidance should be read alongside the following relevant CAA publications:

CAP 2210	Guidance for Space Operations Licence Applicants and Licensees
CAP 2214	Working with the Regulator as a Licensee under the Space Industry Act 2018
CAP 2217	Guidance on Security Matters for Applicants and Licensees
CAP 2218	Guidance on Liabilities and Insurance
CAP 2221	Regulator's Licensing Rules
CAP 2224	Guidance on Applying for a Licence Under the Outer Space Act 1986
CAP 2535	Guidance on Cyber Security Strategies for Applicants and Licensees
CAP 2987	Spaceflight Enforcement Policy
CAP 3227	Spaceflight Regulatory Objectives
SRG 2228	Technical Question Set – Orbital Operators
SRG 2229	Radio Frequency – Spectrum Question Set
Space Industry Act 2018 (SIA)	https://www.legislation.gov.uk/ukpga/2018/5/contents
Space Industry Regulations 2021	https://www.legislation.gov.uk/uksi/2021/792/contents
Spaceflight Activities (Investigations of Spaceflight Accidents) Regulations 2021	https://www.legislation.gov.uk/uksi/2021/793/contents/made
Space Industry (Appeals) Regulations 2021	https://www.legislation.gov.uk/uksi/2021/816/contents

Outer Space Act 1986 (OSA)	www.legislation.gov.uk/ukpga/1986/38/contents