

GUIDANCE FOR RANGE CONTROL LICENCE APPLICANTS AND LICENSEES

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Section 1: Overview of the Guidance

- 1.1 The Space Industry Act 2018 (the Act) regulates all spaceflight activities taking place from the United Kingdom, and associated activities.
- 1.2 The Act requires any person or organisation wishing to:
 - launch a launch vehicle from the UK
 - return a launch vehicle launched elsewhere than the UK to the UK landmass or the UK's territorial waters
 - operate a satellite from the UK
 - conduct sub-orbital activities from the UK
 - operate a spaceport in the UK, or
 - provide range control services from the UKto obtain the relevant licence.
- 1.3 It is supported by [The Space Industry Regulations 2021](#) (the Regulations), that set out in more detail the requirements for each licence, and the [Regulator's Licensing Rules](#), which specify which application form to use to apply for a licence and what information the regulator will require in support of an application.
- 1.4 There is then a series of guidance documents designed to help explain how to comply with the Act and the Regulations. This document is one of the guidance documents.

With the coming into force of [section 1\(3\) of the Act](#), the [Outer Space Act 1986](#) no longer applies to space activities carried on in the United Kingdom, and accordingly the Outer Space Act 1986 does not apply to a person or organisation wishing to carry out spaceflight activities or operate a spaceport in the United Kingdom. The Outer Space Act 1986 **will** continue to regulate the following activities carried out overseas by UK entities: the procurement of the overseas launch of a space object, where the procurement takes place in the UK; the operation of a satellite in orbit from an overseas facility by a UK entity. Extant licences granted under the Outer Space Act 1986 for the carrying out of space activities from within the UK will continue to be governed under that regime. Where an application for a licence has been made under the Outer Space Act 1986, it will be assessed under that Act and – where successful – will result in the award of a licence under the Outer Space Act 1986.

What is the purpose of this guidance document?

- 1.5 This guidance document explains how to apply for a range control licence in relation to spaceflight activities and what information applicants will need to provide. It also sets out the duties of a range control service provider once a licence is granted. In doing so, it provides a summary of relevant sections of the Space Industry Act 2018 – particularly [sections 5-7](#) of the Act.

Who is this guidance for?

- 1.6 This guidance is for any person or organisation that wishes to provide range control services in relation to space or sub-orbital activities. This may include holders of other licences under the Act, who also wish to provide range control services.

- 1.7 The guidance may also be of relevance to people or organisations wishing to apply for other licences under the Act, as there are several areas where responsibilities overlap and where range control service providers may need to obtain or use information from other licensees, and vice versa.

Using this guidance

- 1.8 The guidance is designed to assist in the process of applying for a range control licence, setting out the key requirements of any application and what evidence the regulator will need of an applicant's capabilities. It should be read in conjunction with the [Space Industry Regulations 2021](#), the Regulator's Licensing Rules and the guidance on [Applying for a licence under the Space Industry Act 2018](#).
- 1.9 If applicants have any queries, they are encouraged to contact the regulator to seek clarification or gain further information.

The regulator

- 1.10 The Civil Aviation Authority (CAA) will perform the functions of the regulator under the Act. It is referred to in this guidance as 'the regulator'. Under [section 2 of the Act](#), the regulator must carry out its functions relating to spaceflight activities with a view to securing the health and safety of members of the public and the safety of their property. This duty has primacy over the other matters that the regulator must take into account in exercising its functions.
- 1.11 In performing its functions, the regulator will need at times to review confidential and commercially sensitive information. The regulator already has robust security processes in place that will ensure all the information sent in relation to applications, and monitoring ongoing licensed activities, is handled and protected appropriately. For more details on the regulator's security processes and systems, please contact the regulator.

Contacting the regulator

The regulator can be contacted by email to commercialspaceflight@caa.co.uk. The regulator welcomes and encourages ongoing contact from prospective applicants before they submit an application for a licence. This can be from the earliest stages of considering whether to apply for a licence.

Key terms

- 1.12 The Act regulates:
- space activities
 - sub-orbital activities and
 - associated activities

that are carried out in the UK.

- 1.13 As set out in [section 1 of the Act](#), "space activity" means
- (a) launching or procuring the launch or the return to earth of a space object or of an aircraft carrying a space object
 - (b) operating a space object, or

(c) any activity in outer space

1.14 “A space object” includes the component parts of a space object, its launch vehicle and the component parts of that.

1.15 “Sub-orbital activity” means launching, procuring the launch of, operating or procuring the return to earth of:

- (a) a rocket or other craft that is capable of operating above the stratosphere
- (b) a balloon that is capable of reaching the stratosphere carrying crew or passengers, or
- (c) an aircraft carrying such a craft

but does not include space activity. By way of clarification, the regulator will use the International Standard Atmosphere (47km) as the stratopause (i.e. the upper limit of the stratosphere) for the purposes of determining whether an activity is ‘sub-orbital’.

1.16 Space activities and sub-orbital activities are referred to in the Act as “spaceflight activities”.

1.17 “Spacecraft” means a space object, a rocket or other craft that is capable of operating above the stratosphere or a balloon that is capable of reaching the stratosphere carrying crew or passengers, that is used for spaceflight activities. It includes satellites.

1.18 “Launch” is defined in the Act as including causing a craft to take off (or releasing a balloon).

1.19 Regulation 2 of the Space Industry Regulations defines a launch vehicle, other than in references to a “US launch vehicle”, as:

- “(a) a craft to which section 1(5) of the Act applies and the component parts of that craft,
or
- (b) a space object which is a vehicle and the component parts of that vehicle,

that is used for the purpose of the proposed spaceflight activities or the operator’s spaceflight activities, as applicable, but does not include a payload carried by the launch vehicle;”

1.20 The “craft to which section 1(5) of the Act applies” referred to in part (a) of this definition are:

- a rocket or other craft that is capable of operating above the stratosphere
- a balloon that is capable of reaching the stratosphere carrying crew or passengers

1.21 Part (b) of the definition covers vehicles that are capable of reaching orbit, such as those used to place a satellite payload in orbit. As explained below, the operator of any satellite carried on board a launch vehicle does not require their own launch operator licence, but does require an orbital operator licence.

1.22 Associated activities include the operation of spaceports and range control functions.

1.23 Under the Act, any site from which a spacecraft or carrier aircraft is intended to launch is considered a spaceport and must be licensed. A site at which controlled and planned landings of spacecraft are to take place is also a spaceport and must be licensed.

- 1.24 Range control services are defined in [section 6](#) of the Act as:
- “(a) identifying an appropriate range for particular spaceflight activities;
 - (b) co-ordinating arrangements for the activation and operation of the range;
 - (c) obtaining all necessary information for identifying the range and for co-ordinating its activation and operation;
 - (d) ensuring that notifications are issued for the protection of persons who might be put at risk by spacecraft or carrier aircraft within the range or in the vicinity of it;
 - (e) monitoring the range, and the spacecraft or carrier aircraft for which it is provided, to ascertain
 - (i) whether the restrictions or exclusions to which the range is subject are complied with;
 - (ii) whether planned trajectories are adhered to;
 - (f) communicating any failure to comply with those restrictions or exclusions, or to adhere to those trajectories, for the purpose of enabling any appropriate actions to be taken in response;
 - (g) any prescribed services provided for the purposes of, or in connection with, services within any of paragraphs (a) to (f).”
- 1.25 Under [section 13\(1\) of the Act](#), the regulator has the power to include conditions in an operator licence (launch operator licence, return operator licence and orbital operator licence), spaceport licence and a range control licence. Licensees must comply with those conditions. [Schedule 1 of the Act](#) includes a list of examples of conditions, but this is not exhaustive, and the actual conditions included in a licence will vary depending on the operation planned and the type of licence issued. When deciding what conditions to include in a licence, the regulator must consult the public bodies, including the Health and Safety Executive, listed in [section 13\(6\) of the Act](#). Whenever the guidance refers to the regulator imposing conditions (other than a condition which the regulator is required to impose via the Regulations under section 13(3)), the obligation to consult these bodies applies.

Carrying out spaceflight activities at sea

- 1.26 If a person is proposing to launch or carry out other spaceflight activities from UK territorial waters or from a UK flagged ship elsewhere, the Act and Regulations will regulate the activities. A regulation referring to land also applies, if appropriate, to spaceflight activities from a ship. For example, if appropriate, reference to a "place" or "other place" from which activities take place has been added to a regulation which refers only to activities from land. If a person is proposing to launch or carry out other spaceflight activities from a foreign flagged ship outside UK territorial waters and is a British national, UK body corporate or Scottish firm, the Outer Space Act 1986 regulates these activities.
- 1.27 Sea launch and other sea activities are a complex area; organisations wishing to conduct sea launches are advised to contact the regulator before applying for a licence. Further information on this can be found in section 2 of the guidance document [Applying for a licence under the Space Industry Act 2018](#).

Requirements and expectations

- 1.28 Where the guidance uses the term “must”, this refers to a requirement in or under the Act. If applicants / licensees fail to meet that requirement, it could result in the licence not being granted or being revoked or suspended. Where it is stated that “the regulator expects”

applicants to do something, this describes a preferred approach; however, it is not a legal requirement to comply with the regulator's expectations.

Types of licence

1.29 The Act refers to three types of licences that can be awarded:

- operator licence
- spaceport licence
- range control licence

1.30 Following the publication of the Act, it was agreed that there should be different licensing requirements for different types of operators. For example, some organisations that would want to operate space objects (such as satellites or research vehicles) would not have a launch capability, and instead would wish to procure such capability and then operate the object once it reached orbit. While these organisations clearly do not need a licence to operate a launch vehicle, they are still required to obtain an operator licence to operate their object in space. Reflecting the various circumstances, there are now five licences available:

- **Launch operator licence:** means an operator licence within [section 3 of the Act](#) which authorises a person or organisation to carry out spaceflight activities that include launching a launch vehicle or launching a carrier aircraft and a launch vehicle. This is the type of licence needed if a person or organisation wants to launch a launch vehicle or use a carrier aircraft to assist with a launch of a launch vehicle. A person or organisation holding a launch operator licence is referred to as a spaceflight operator,¹ or in some circumstances, launch operator licensee. If a launch operator licensee wishes to return a launch vehicle launched from the UK or the UK's territorial waters to land in the UK, it can apply to do so under the launch operator licence and does not need to apply for a separate return operator licence.
- **Return operator licence:** means an operator licence within section 3 of the Act which is not a launch operator licence and which authorises a person or organisation to operate a launch vehicle, launched into orbit from elsewhere than the United Kingdom, in order to cause that vehicle to land in the United Kingdom. This is the type of licence needed if a person or organisation wants to return a launch vehicle, launched elsewhere than the United Kingdom, to land in the UK or within the UK's territorial waters. A person or organisation holding a return operator licence is referred to as a spaceflight operator,¹ or in some circumstances, return operator licensee.
- **Orbital operator licence:** means an operator licence which authorises a person or organisation to procure the launch, operate a space object or conduct other activity in outer space. The most common example of activities that would be licensed under an orbital operator licence are the procurement of a satellite launch and the operation of a satellite. However, the licence may also cover any other activity in outer space, and is

¹ The term spaceflight operator is used in the Regulations to refer to both the holder of a launch operator licence and the holder of a return operator licence. Any references to spaceflight operator in the Regulations or guidance encompass both licence types, so any requirements for spaceflight operators are applicable to both launch operator licensees and return operator licensees. Where a requirement only applies to either a launch operator licensee or return operator licensee, this is clearly stated.

not limited to activities in Earth's orbit. For example, an orbital operator licence would be needed for missions in lunar orbit, lunar surface missions, or deep space probes. A person or organisation holding an orbital operator licence is referred to as an orbital operator licensee.

- **Spaceport licence:** means a licence granted under [section 3](#) of the Act authorising a person or organisation to operate a spaceport (i.e. a site from which spacecraft or carrier aircraft can be launched or a site at which controlled and planned landings of spacecraft can take place²). Spaceports can be licensed for vertical or horizontal launches (or potentially both). A horizontal spaceport must be located at an aerodrome that is already CAA licensed or certified and National Aviation Security Programme (NASP) directed. A person or organisation holding a spaceport licence is referred to as a spaceport licensee.
- **Range control licence:** means a licence granted under [section 7](#) of the Act authorising a person or organisation to carry out range control services in relation to spaceflight activities. That includes identifying an appropriate range; coordinating the use of a range; issuing protective notifications and monitoring the range. A person or organisation holding a range control licence is referred to as a range control licensee.

Examples of offences and enforcement directions under the Act

- 1.31 Under [section 3 of the Act](#), it is an offence to carry out spaceflight activities or operate a spaceport in the UK without the required licence. It is also an offence to make a false statement for the purpose of obtaining an operator licence or a spaceport licence. A person who commits an offence under this section of the Act may be liable to a fine or imprisonment for a term not exceeding 2 years, or both.
- 1.32 Under [section 7 of the Act](#), it is an offence for range control services to be provided by anyone other than the Secretary of State, or a person or organisation authorised to provide them by a range control licence. It is also an offence for a person to make a false statement for the purpose of obtaining a range control licence. A person who commits an offence under this section of the Act may be liable to a fine or imprisonment for a term not exceeding 2 years, or both.
- 1.33 Under [section 13 of the Act](#), the regulator can grant a licence subject to conditions it thinks appropriate or must include a licence condition if required to do so by a regulation (see regulations 9(5) and 10(2)). When a condition is imposed, it is an offence for a licensee to fail to comply with that condition.
- 1.34 Under [section 17 of the Act](#), it is an offence for a spaceflight operator to allow any person to take part in spaceflight activities without them having given their informed consent and fulfilling the age and mental capacity criteria referred to in Part 12 of the Regulations. Under [section 18 of the Act](#), it is an offence a licensee to allow any unqualified individual to take part in activities authorised by the licence or work in a specified role.

² Ships used for sea launch or landing are not "sites" and are therefore not spaceports for the purposes of section 3 of the Act and so do not need a spaceport licence. However, certain types of installations at sea may be regarded as a "site" and so come within the definition. A person who wants to launch from, or land at, an installation at sea should contact the regulator to find out whether the installation they propose to use requires a spaceport licence.

- 1.35 Under [section 27 of the Act](#), the regulator can also issue directions that enable effective enforcement action to be taken, where it appears to the regulator that a person is carrying out spaceflight activities or associated activities without a licence, in contravention of licence conditions or in contravention of the Act or rules made under it.
- 1.36 Under section 27(2), “the regulator may give any directions to that person that appear necessary to be in the interests of safety or for the purposes of securing compliance with–
- (a) the conditions of a licence,
 - (b) provisions contained in or made under this Act, or
 - (c) the international obligations of the United Kingdom.”
- 1.37 It is an offence for a person in receipt of a section 27 direction to fail to comply with it (see [section 31\(3\)\(a\) of the Act](#)). The regulator could also, if it wished to do so, enforce compliance by way of an injunction or equivalent (see section 31(4)).
- 1.38 There are further direction-making powers in the Act, including power for the Secretary of State to give directions under [section 28\(3\)-\(4\)](#) and [section 29\(1\)](#).

The full list of guidance documents issued in relation to the Act

- 1.39 The following guidance documents are available in relation to licences that can be granted under the Act (and any statutory instruments made under the Act):
- Applying for a licence under the Space Industry Act 2018
 - Guidance for launch operator and return operator licence applicants and licensees
 - Guidance for spaceport licence applicants and licensees
 - Guidance for range control licence applicants and licensees
 - Guidance for orbital operator licence applicants and licensees
 - Guidance for the assessment of environmental effects
 - Guidance on security matters for applicants and licensees
 - Guidance on the investigation of spaceflight accidents
 - Guidance on appealing decisions made under the Space Industry Act 2018 and Outer Space Act 1986
 - Guidance on insurance requirements and liabilities under the Space Industry Act 2018
 - Guidance on duties for all licensees under the Space Industry Act 2018 including monitoring and enforcement by the regulator
- 1.40 In addition, applicants and licensees must follow the [Regulator’s Licensing Rules](#) and are advised to read the [Principles and guidelines for the spaceflight regulator in assessing ALARP and acceptable risk](#).

Section 2: Legislative Background

The Space Industry Act 2018

- 2.1 As set out above, the Space Industry Act 2018 regulates all spaceflight activities taking place from the United Kingdom. This includes space activities, sub-orbital activities, and all associated spaceflight activities.
- 2.2 It requires any person or organisation wishing to undertake such activities to obtain the relevant licence.
- 2.3 It supersedes the Outer Space Act 1986 for all activities launched from or taking place in the UK.

Sections 5-7 of the Space Industry Act

- 2.4 [Sections 5-7](#) of the Space Industry Act set out the primary requirements for range control licences.
- 2.5 They include the following definition of “range” in [section 5](#):
“a zone which (or two or more zones each of which) is subject to restrictions, exclusions or warnings for keeping it clear, at the relevant times, of—
 - (a) persons or things that might pose a hazard to spaceflight activities, and
 - (b) persons or things to which spaceflight activities might pose a hazard.”
- 2.6 Range control services are then defined in [section 6](#) as:
“(a) identifying an appropriate range for particular spaceflight activities;
(b) co-ordinating arrangements for the activation and operation of the range;
(c) obtaining all necessary information for identifying the range and for co-ordinating its activation and operation;
(d) ensuring that notifications are issued for the protection of persons who might be put at risk by spacecraft or carrier aircraft within the range or in the vicinity of it;
(e) monitoring the range, and the spacecraft or carrier aircraft for which it is provided, to ascertain—
 - (i) whether the restrictions or exclusions to which the range is subject are complied with;
 - (ii) whether planned trajectories are adhered to;
(f) communicating any failure to comply with those restrictions or exclusions, or to adhere to those trajectories, for the purpose of enabling any appropriate actions to be taken in response;
(g) any prescribed services provided for the purposes of, or in connection with, services within any of paragraphs (a) to (f).”
- 2.7 A licence is required to provide these services to support space activities. This guidance explains how to apply for a range control licence.
- 2.8 Other sections of the Act set out various criteria for applicants or licensees. Many of these apply to applicants for any licence under the Act. These further criteria are referred to where appropriate in this guidance.

The Space Industry Regulations 2020

2.9 In addition to the Act itself, Part 6 of the Space Industry Regulations 2020 covers range control.

- Regulation 42 sets out requirements regarding the organisation, management and capability of a range control licensee
- Regulations 43 to 45 set out the agreements that a range control licensee must have with third parties, if the licensee is monitoring the range for spaceflight activities
- Regulations 46 to 48 set out the requirements relating to the identification of an appropriate range for spaceflight activities (“the designated range”), including the matters to be taken into account, the persons requiring to be notified of the details relating to the designated range, the identification of hazard areas within the designated range and the monitoring of hazard areas
- Regulations 49 to 51 set out the requirement to notify certain persons and issue warning notices in connection with monitoring the designated range
- Regulation 52 sets out a requirement for the range control licensee to establish and maintain a safety management system and a quality management system
- Regulations 54 and 55 set out some additional requirements for spaceflight operators who want to provide range control services for their own spaceflight activities, to ensure that the functions are appropriately independent

2.10 This guidance expands on the regulations and provides applicants for a range control licence with further details of how they will be expected to demonstrate that they can meet the requirements, as part of their licence application.

Commencement of the Act

2.11 The Space Industry Act 2018 received Royal Assent on 15 March 2020, providing a legislative framework for the licensing of space activities, sub-orbital activities, and associated activities carried out in the UK. However, many of the Act’s provisions will only come into force on [date], when the Space Industry Regulations come into force. From that date, people and organisations will be able to apply for a licence to:

- launch a launch vehicle from the UK for sub-orbital missions involving human occupants, or return such a launch vehicle to the UK
- launch a launch vehicle from the UK for orbital missions that do not involve human occupants, or return such a launch vehicle to the UK
- procure the launch from the UK of a space object (such as a satellite) into orbit
- operate a satellite from the UK
- operate a spaceport in the UK, or
- provide range control services in the UK

2.12 However, at the point the Regulations come into force, it will not be possible to apply for a licence for some activities that are permitted under the Act. These include:

- the licensing of space activities involving an orbital launch vehicle with human occupants
- the licensing of spaceflight activities involving hypersonic (or any other experimental) transport from A to B

- 2.13 Such activities are technically complex and difficult to regulate. By their very nature, they will require global collaboration on common standards to a much higher threshold than is achievable with current technologies.
- 2.14 These restrictions are set out in Commencement Regulations, which also include provisions to ensure that the licensing of a procurement of an overseas launch carried out under the Outer Space Act can continue to be done under that Act, whether such a procurement takes place in the UK or overseas.

Section 3: Applying for a range control licence

- 3.1 To apply for a range control licence, a person or organisation must provide appropriate information to the regulator so that the regulator can make a reasoned judgement on the suitability of the application.
- 3.2 Regulations 19-20 set out the process by which the regulator must consider and determine an application. Regulation 18 provides that an application must be made in writing in the form specified by the regulator and accompanied by the information specified by the regulator. Further details are set out in the Regulator's Licensing Rules.
- 3.3 The application form requires **all** applicants to:
 - demonstrate that they, and any individual who needs to meet the eligibility criteria in Chapter 1 of Part 3 of the Regulations, meet eligibility criteria
 - provide details of their legal status
 - provide evidence of their financial and technical resources
- 3.4 Full details of the information required are set out in Table A of the Regulator's Licensing Rules.
- 3.5 Applicants for a range control licence are then required to provide additional information about the proposed activity and the demonstration of technical capability for a range control licence. The required information is set out in the application form and in Table F of the Regulator's Licensing Rules. This guidance focuses on the information listed in Table F and the application form.
- 3.6 Section 5 of this guidance provides further details on the information that the regulator will expect to see as part of a range control licence application.
- 3.7 The Regulations do not specify one fixed model for delivering range control services and are instead focused on the outcomes to be achieved. This approach is intended to acknowledge that there is the potential for a variety of types of range control operation, using different equipment, to provide different functions.
- 3.8 For example, a range control service provider might propose to use ground-based radar to track a launch vehicle, but the same outcome could also be achieved using satellite-based tracking. A sub-orbital spaceplane launch might require a reduced range control operation, when compared with a vertically-launched rocket.
- 3.9 Rather than specifying minimum performance criteria for range equipment, the Regulations instead place requirements that the range control service provider must be able to achieve the outcome specified by the launch operator licensee's safety case, such as tracking the launch vehicle with a particular level of accuracy.
- 3.10 Therefore, when applying for a range control licence, applicants will need to describe in detail the services they intend to provide, and how their operation will achieve the desired outcome.

This can be understood further through the diagram below, which sets out the core functions of a range control service operation along with examples.

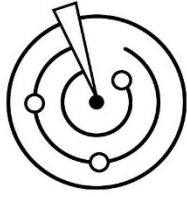
3.11 A range control service provider may also wish to provide other services which are not categorised specifically as range control services under the Act, such as:

- providing meteorological data such as weather forecasts
- non-flight safety telemetry information
- flight termination

3.12 A range control licence is not required to provide these services. However, if the launch operator licensee's safety case is reliant on these functions being performed by the range control service provider as an agent of another licensee, the regulator may still need to assess the range control service provider's capability to carry them out.

RANGE CONTROL SERVICES

Ensuring monitoring of all areas that are required by the launch operator's safety case, such as stage drop zones where the safety case requires active surveillance to ensure that they are clear

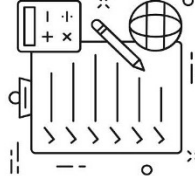


TRACKING

A licensee carrying out a tracking function will need to demonstrate that they can do so to the standard required by the launch operator's safety case



Ensuring co-ordination between the different functions of the range licensee(s) with the overall launch operation



CO-ORDINATION

Arranging for the issuing of notifications such as Notices to Airmen (NOTAMs) to ensure that other parties are aware of the launch operation and any risk it might pose



NOTIFICATION

Working with the launch operator licensee to identify how the range will meet the requirements of the launch operator's safety case, such as establishment of hazard areas or flight limit lines, and confirming that the range licensee can provide this



IDENTIFICATION

A range control service provider would not necessarily need to provide all of these functions in order to obtain a licence. For example, if the launch operator licensee were licensed to use a vehicle with an autonomous flight termination system, this could remove the need for a tracking function provided by the range control service provider if the safety case allowed this.

The application process

- 3.13 As set out in the guidance document [Applying for a licence under the Space Industry Act 2018](#), the regulator will review the application and the information and assess it against the provisions in the Act and requirements in the Regulations and the Regulator's Licensing Rules. The regulator will act in accordance with its duties and supplementary powers as set out in [section 2](#) of the Act, with particular regard to the safety priorities established in that section.
- 3.14 After reviewing the application and the information submitted with the application to assist in considering the application, the regulator may request the applicant in writing to:
- make available for inspection by the regulator any site, facility, equipment, craft such as the launch vehicle and carrier aircraft to be used in connection with the activities which are the subject of the application as the regulator may specify
 - produce for inspection any document or record in possession or control of the applicant as the regulator may specify
 - make available for interview any officer or employee of the applicant or any other person acting on the applicant's behalf
- 3.15 The applicant must comply with any such request from the regulator within the timescales specified by the regulator. In addition, the applicant must provide such assistance as a person appointed by the regulator to carry out an inspection may reasonably request, such as:
- making available relevant officers or employees to provide information relating to the inspection
 - unlocking doors
 - disassembling equipment, or
 - demonstrating its use

The person appointed by the regulator to carry out an inspection may take samples, photographs and measurements when carrying out the inspection and make a record of any information from the inspection.

- 3.16 Regulation 19(6) provides that the regulator may:
- take copies of a document or record produced by the applicant
 - record an interview with an officer or employee of the applicant or another person acting on the applicant's behalf
 - disclose information it holds relating to the application (including copies of documents or records or any recording referred to above) to:
 - the Secretary of State
 - a person acting on behalf of the country which is a party to an agreement between the United Kingdom and another country, for the purposes of consulting that country about the application
 - the Space Accident Investigation Authority, or any other national or international body investigating spaceflight accidents, for the purposes of obtaining information about any safety recommendations relevant to the activities referred to in the application
 - any person consulted under [section 13\(6\) of the Act](#) (conditions of licences) or any other person consulted about conditions to be included in the licence

- any other public authority or international organisation responsible for regulating any aspect of spaceflight activities
 - any other person for the purposes of them providing a technical assessment of the activities which are the subject of the application, or legal advice or information relevant to such activities
- 3.17 The regulator can only disclose US technical data with the consent of the Government of the United States, after consultation between the regulator, the Secretary of State and the Government of the United States. US technical data is defined in the [Technology Safeguards Agreement](#) (TSA), which is the Agreement between the UK and US governments on technology safeguards associated with US participation in space launches from the UK.
- 3.18 Given the quantity of information required and the time needed to assess that information, applications should be submitted well in advance of the date the applicant wishes to start providing range control services. In general, the length of the period of assessment will reflect the complexity of the application.
- 3.19 The regulator will only grant a licence if it is satisfied that the applicant has the necessary resources, skills and capabilities to undertake the proposed activities.
- 3.20 As set out in [Applying for a licence](#), the regulator may attach conditions to any licence it issues.

Use of agents

- 3.21 As set out in row 6 of Table F of the [Regulator’s Licensing Rules](#), applicants are required to provide certain information concerning any proposal to appoint an agent to carry out range control services on their behalf. This requirement is derived from [section 7\(3\) of the Act](#):

“A person does not require a range control licence to provide, as employee or agent of another person, range control services the provision of which are authorised by a range control licence granted to that other person.”

Note: A person **does** require a licence to provide range control services authorised by a range control licence on a range control licensee’s behalf, if that person is not an employee or agent of the licensee, or the person may commit an offence under section 7(8) of the Act.

- 3.22 The information to be supplied under the Regulator’s Licensing Rules is:
- identity information regarding any such agent, as set out in section 1 of Table A of the Regulator’s Licensing Rules
 - any documents which evidence the capability of such an agent to carry out those activities
 - an agency contract
- 3.23 The documents that provide evidence of the capability of an agent to provide range control services on behalf of an applicant or licensee must include a detailed description of the range control services the agent will carry out. In addition, the agency contract with the licensee should be in writing and include:
- an authorisation for the agent to provide the agreed range control services, and

- a schedule of the terms on which the agent will provide the agreed range control services on behalf of the licensee

3.24 Before the issuing of any licences/commencement of licensing by the regulator, the regulator will publish a schedule of minimum required terms to be included in any agency contract between the licensee and its agents.

Section 4: Duties of a range control licensee

- 4.1 Many of the tasks that fall to a range control service provider will be determined by the characteristics of the individual spaceflight activity and defined in documentation such as the launch operator licensee's safety case and safety operations manual. This interaction is described in more detail in section 6 of this guidance.
- 4.2 Separately to this, the Regulations set out some requirements for:
- things that a range service control provider must have in place, such as management structures, a safety management system and a quality management system
 - activities that must be performed by the range control service provider, prior to, during, or after the spaceflight activity

The range control licensee's organisation and management, safety management, and quality management systems

- 4.3 Regulation 42 sets out some requirements relating to the range control licensee's organisation and management.
- 4.4 The organisational and managerial requirements are designed to be scalable and to be satisfied in a way that is proportionate and representative of the extent and complexity of the proposed range control activities. The licensee will need to demonstrate that it has in place:
- the financial and technical resources to provide the services the licence would authorise
 - sufficient suitably qualified and experienced operating staff and a management structure proportionate to the type of services that are being provided
 - facilities, infrastructure and equipment required to provide the services
 - an organisation which is capable of complying with all relevant requirements imposed by regulations and gives due priority to safety in relation to the provision of its range control services
- 4.5 Regulation 52 sets out a requirement for range control licensees to have management systems in place to ensure the safety, quality and reliability of the services that they are responsible for. For example, this includes systems to ensure that radar equipment used for tracking or surveillance will function properly during a launch operation. Applicants must provide the regulator with details of their safety management system (SMS) and quality management system (QMS).
- 4.6 Schedule 4 specifies the requirements and matters to be addressed by the SMS for spaceflight operator and spaceport licensees. While this schedule does not directly apply to range control licensees, it may be used as framework to develop the SMS. For further information, refer to Guidance for launch and return operator licence applicants and licensees paragraph 7.20 to 7.26.
- 4.7 Unlike the activities of a spaceflight operator and spaceport, range control activities do not directly create major accident hazards. Instead, range control licensees provide a service that, among other things, helps to prevent or mitigate the consequences of major accidents arising from the spaceflight operator's licenced activity. This difference should be reflected in the range control service provider's safety management system. In particular, this means that:

- any roles and responsibilities that fall to range control licensee personnel under the launch operator licensee’s safety management system must be clearly documented and defined; this is set out in more detail in section 6 below
- hazard identification processes included in the range control licensee’s SMS should be focused on the services the licensee provides and how their failure might contribute to a major accident. The licensee should still take into account human factors and any range control security risk assessment it is required to undertake
- operational control procedures should be developed and defined to ensure that the range control licensee’s contribution to the risk of major accidents is minimised as far as it reasonably practicable. These procedures should include arrangements for maintenance of equipment, pre-operation checks and verifying the knowledge of relevant staff. Procedures should also describe what range control personal will do in the event of service failing i.e. loss of surveillance capability

The QMS

- 4.8 The quality management system should set out how it will maintain quality control and quality assurance during design, manufacture, integration and test of its range system. Range control licensees must also describe how they will keep records of quality management processes. The regulator can request to see the records at any time, including after a licence has been granted.
- 4.9 The International Organization for Standardization publishes guidance on developing effective systems for quality management.³

Identification of the designated range for a particular spaceflight operation

- 4.10 Identifying the designated range for a particular launch activity is crucial to public safety for any spaceflight operation. It requires consideration of a number of matters, set out in regulation 46-48, to determine the extent of any zone or zones⁴ that need to be subject to restrictions, exclusions or warnings during a spaceflight operation.
- 4.11 The matters for consideration in identifying a designated range can be summarised as:
- details of the vehicle(s) that will be used, including its anticipated speed and how it will be launched
 - the planned route and trajectory
 - expected drop zones where debris is anticipated to fall, according to the safety case produced by the launch operator licensee
 - who could be affected by the launch – local residents or those engaged in activities in the vicinity of the launch site or trajectory
 - the capabilities of the monitoring equipment that the applicant intends to use
 - the capabilities of the termination equipment intended to be used
 - relevant meteorological conditions which are expected to apply before and during the launch, flight or controlled or planned landing
- 4.12 In identifying the designated range, the range control licensee must address several details set out in regulation 46(3) including identifying all areas of land, sea and airspace within the

³ See www.iso.org/iso-9001-quality-management.html

⁴ ‘zone’ is defined in section 5(1) of the Act

designated range, the inner and outer boundaries, and locations of relevant facilities and equipment.

4.13 Once the designated range is determined, it is then the responsibility of the range control licensee to provide written details of the designated range to:

- the regulator
- the launch operator licensee
- the spaceport licensee

4.14 In its initial safety case, the launch operator licensee may have already included detailed calculations of the range measures that will be required to mitigate the risks of the activity. The range control licensee must independently set out the designated range that it will be providing, and confirm that the services that it is authorised to provide under its licence are sufficient to meet the requirements of the launch operator licensee's safety case.

4.15 At the time of the range control licence application, the regulator will assess the applicant's capability to perform this task. This is described in more detail in section 5 of this guidance.

Identification and monitoring of hazard areas

4.16 Regulation 47 places a requirement on the range control licensee when identifying the designated range, to also identify any hazard areas within the range, and describe how these areas will be managed.

4.17 Once identified, the range control licensee must then divide these areas into one of three categories:

- exclusion zones, where active measures must be taken to ensure that no-one enters the area during the spaceflight activity
- warning zones, where measures must be taken to clearly identify the area to people who might enter it and warn them of a hazard
- restriction zones, where some people may be permitted to enter, such as range control service provider personnel, but others must be excluded

4.18 The range control licensee must identify the dimensions, location and boundaries of any hazard areas, and how they will be managed. It must then communicate this information to the regulator, the other licensees, and the relevant authorities listed in regulation 45.

4.19 Under regulation 48, if the licensee is providing monitoring services for hazard areas, it must take appropriate measures to protect an exclusion or restricted zone from unauthorised entry, and ensure that notices have been issued for a warning zone.

4.20 The Regulations do not specify the particular measures that must be taken to protect an exclusion or restricted zone; these will be defined by the launch operator licensee's safety case for a particular spaceflight activity. However, the Regulations set out that it is the range control licensee's responsibility to ensure that any such zones are protected, once the measures have been agreed upon.

4.21 In practice, this is likely to involve:

- physical measures such as patrols, barriers, or road closures to protect areas where this is possible
- surveillance to protect other areas, such as areas of sea or airspace, so that if these areas are in danger of being breached before or during a spaceflight activity, this information can be quickly acted upon in accordance with the procedures in the launch operator licensee's safety operations manual

4.22 If the range control licensee is using sophisticated equipment such as radar to provide monitoring services, it will need to demonstrate the capability of this equipment in detail during the licence application process. This demonstration is described in more detail in section 5 of this document.

Issuing of notifications

4.23 To minimise the risks associated with a spaceflight operation, it will be necessary to notify other users (and potential users) of the area covered by the range about when and where operations are taking place and what restrictions are in place as a result. A range control licensee might be issuing notifications itself, or providing information for a third party to issue them, such as an air navigation service provider.

4.24 Regulations 49-51 set out requirements for the issuing of notifications by range control licensees when providing this service:

- regulation 49 sets out the requirement to notify, and a list of people and organisations that must be notified. This includes the CAA, any local authority with administrative responsibility for areas covered by the range, the emergency services that cover the area, every owner, lessee or occupier of land in the range and anyone specifically named in a condition of the licence
- regulation 50 sets out some requirements about how information must be given to third party organisations who are issuing notifications on the licensee's behalf
- regulation 51 sets out some further requirements in relation to warning zones

4.25 It is recommended that where possible range control licensees use existing, established systems to notify people such as Notices to Airmen (NOTAMs), and familiarise themselves with the requirements of issuing these.

Notifying foreign governments

4.26 If any part of the identified range falls in the territory or territorial waters of a foreign country, it is essential that the relevant authorities in that country are informed.

4.27 If the applicant believes it is likely that any part of the identified range of operations it is responsible for **will** fall in the territory or territorial waters of a foreign country, it should set this out in its application.

4.28 The exact requirements of notification may vary between countries and their agencies; these are not covered by these regulations, but the regulator may include additional conditions in a range control licence requiring foreign governments to be notified.

Agreements and communications with relevant authorities

- 4.29 Regulations 43-45 set out requirements for range control licensees who are providing monitoring services about holding agreements with relevant authorities, that set out information the licensee will provide and how the licensee will co-operate with these relevant authorities before and during a spaceflight activity.
- 4.30 In practice, the relevant authorities are likely to be the organisations responsible for managing safety in the sea and airspace environments that fall within the range. For example, during the spaceflight activity, the range control licensee may need to be in real-time contact with the air navigation service provider (ANSP) responsible for the airspace, to ensure that up-to-date information about aircraft in the area is available.
- 4.31 The agreements are necessary to ensure that the exact details of how the organisations will co-operate are clear and defined. They also ensure that the organisations have sufficient time to put measures in place to fulfil their own responsibilities, for example the establishing of danger areas in the airspace.
- 4.32 Regulation 45 also sets out a requirement that the range control licensee has effective and reliable means of communication with these organisations. Applicants for a range control licence will need to demonstrate the capability of this equipment in detail in their licence application.

Example

A range control licensee intending to provide services for launches from the north of Scotland would need to make contact with the ANSP responsible for that region. The range control licensee will not be responsible for operational management of the airspace but would need to work closely with the ANSP to ensure that it is provided with the right information about the launch at the right times to allow the airspace to be managed safely.

The range control licensee would meet with the ANSP to establish the procedures for their co-operation, which would then be set out in the relevant agreement referred to in paragraph 4.30 above. In this example, this agreement would include:

- what measures will be in place to manage the airspace, such as the establishment of Temporary Danger Areas
- the timings and geographical boundaries of these areas, such as how long before and after the expected launch time they are active, and the map co-ordinates
- the named points of contact in organisations who will be in real-time contact during the launch
- the methods of communication they will use during launch (phone numbers, radio frequencies, back up communication methods)
- how the ANSP intends to manage the airspace during the operation, such as diversion of flights from established routes, and which routes they will be diverted to in order to avoid the danger area
- what information is needed in order to issue NOTAMs, and how long before the date of launch the range control licensee will provide this information

Specific safety roles: range safety manager, range operations manager, range accountable manager

- 4.33 All range control licensees must appoint personnel to fill specific safety roles. The range safety manager, range operations manager, and range accountable manager are prescribed roles under Part 3 of the Regulations and anyone nominated for these roles must meet the eligibility criteria set out in regulations 5 and 6.
- 4.34 The range safety manager is responsible for:
- the day-to-day development, administration and maintenance of an effective safety management system
 - examining all aspects of the range control licensee's activities, to ensure that they are carried out safely, and
 - monitoring those involved in the range control licensee's activities to ensure compliance with the licensee's safety policies and procedures
- 4.35 The range operations manager is responsible for ensuring that the range control licensee's licensed activities are properly and safely undertaken in accordance with the range control licence and requirements imposed on the range control licensee in or under the Act.
- 4.36 The range accountable manager is responsible for establishing and maintaining an effective management system, and for ensuring that the range control licensee's licensed activities can be financed and carried out in accordance with the provisions of the Act and the Regulations.
- 4.37 The Regulations also require personnel to fill corresponding roles for launch and spaceport operators. So that spaceflight activities can be conducted safely, it is important that the range control licensee's operation is properly integrated with other licensees', and individual roles may differ between operations. Therefore the Regulations do not place the more specific responsibilities on the prescribed roles for range control licensee personnel that they do for launch operator licensee personnel. However, it is expected that:
- the range safety manager will report directly to the accountable manager and have a duty to inform that manager of all safety concerns relating to the operator's spaceflight activities, where these are to be carried out by personnel of the range control service provider
 - the range operations manager will be the person in overall operational control of the range during the spaceflight activity and will check that all reported safety concerns have been addressed before the range is operated
- 4.38 In practice, the launch operator licensee's safety operations manual will need to clearly define the interactions and reporting structures between launch operator and range control licensee personnel. Section 6 of this guidance sets out in more detail how the range control licensee's operation must be integrated with the launch operator licensee's operation.

Section 5: Information required as part of a range control licence application

- 5.1 The regulator will use a set of assessment criteria when reviewing an application for a range control licence to determine whether the application meets the requirements set out in the Regulations, and whether the applicant has the capabilities to carry out the functions the licence would authorise. The table below sets out the different areas of these criteria, and this section sets out the information that the applicant must provide for each of these.
- 5.2 Additionally, the applicant must also submit some other information about their organisation which is set out below. These are the documents which evidence the capability of the applicant to provide the proposed range control services as referred to in Box 2 of Table F of the Regulator’s Licensing Rules and, where the range control licence applicant proposes to conduct its activities from a ship, in Box 7 of Table F.

Table of assessment criteria

Range approach overview	<ul style="list-style-type: none"> • Overview of range operational picture • Safety-critical functions
Co-ordination	<ul style="list-style-type: none"> • Description of how the applicant intends to integrate all range systems
Identification	<ul style="list-style-type: none"> • Identification of appropriate range boundaries and zones
Notification	<ul style="list-style-type: none"> • Notifications plan • Identification of organisations and groups that need to be notified • Systems and procedures used to issue and verify notifications
Boundary control	<ul style="list-style-type: none"> • Any proposed boundaries which require management
Monitoring (tracking & surveillance)	<ul style="list-style-type: none"> • Tracking of the launch vehicle • Surveillance of the identified range areas
Additional range functions	<ul style="list-style-type: none"> • Flight termination functions • Meteorological functions • Non flight safety telemetry

- 5.3 For each approach to providing range control functions, it is expected that the applicant will provide a description with graphical/diagrammatic aids to accurately describe their solution and the systems involved. These diagrams should detail:
- the functional architectures of the systems and sub-systems
 - the interactions and interfaces between the different sub-systems including between functions
 - the system specifications where appropriate and the standards to which they are designed/specified
 - the verification plan for each system identified; this includes but is not limited to a verification control document indicating the analysis approach, testing methodology and calibration of systems

Range approach overview

- 5.4 The applicant should provide an overview of the range operation it intends to provide, including:
- which services it wishes to provide and how they will be delivered
 - which types of launch or launch vehicle the operation is intended to support
 - key pieces of equipment it will be using, such as radar
 - the heritage or experience of identified equipment in comparable situations and the experience of any key personnel
- 5.5 The system described to provide the range control services should demonstrate the applicant's approach to managing safety-critical equipment and functions, and should identify elements of the range control system that sit on the safety-critical path and could lead to a mission failure. The applicant should identify:
- safety-critical components of the system
 - their probability of failure and potential failure modes
 - what mitigation is in place, such as redundancy in systems for single points of failure

Co-ordination

- 5.6 The applicant should provide information about how the different range control service functions and systems will be integrated to provide the overall range control service. This should include details of:
- systems being used to manage, collate and communicate information, including command & control systems
 - systems for internal communication between range control personnel, such as radio networks
 - the operational reporting structure and hierarchies of range control personnel (see also wider organisational structure below)
 - roles, responsibilities and procedures for making operational safety-critical decision-making
 - range facilities, infrastructure and any assets such as tracking and surveillance equipment, or vehicles
 - key points of interaction with other identified licensees, i.e. launch operator or spaceport licensees
 - key points of interaction with external organisations such as ANSPs
 - agreements and licences held with other regulatory agencies or key stakeholders
- 5.7 Some of this information may not be available at the time of licensing, for example if a range control licence applicant has not yet identified which launch operator licensee(s) it intends to provide services for. In these situations, the regulator may impose licence conditions which require the licensee to provide further information before the licensee can provide services.

Identification

- 5.8 Applicants must demonstrate their capability to identify the designated range as part of their application. There are two ways this can be done:
- if the details of the launch operation(s) that the range control licence applicant intends to provide services for already exist, then analysis can be performed based on that operation's safety case and launch vehicle(s)

- if no vehicle has yet been identified, the range control licence applicant can set out analysis based on a hypothetical launch operation and vehicle that is representative of the type of operation it wishes to provide services for

5.9 The analysis used in the application will be examined by the regulator as evidence of an applicant's capability. However, the specific range control measures employed for any operation can only be defined once the details of the operation are confirmed and a date of launch or planned return of launch vehicle has been set. For example, the number or size of hazard areas may be different depending on the characteristics of the launch vehicle or the meteorological conditions on the day.

Notification

5.10 For an individual launch, the launch operator licensee's safety case will determine the exact details of where and when notifications need to be issued. For the issuing of a range control licence, the regulator will look for confirmation that the range control licence applicant has the capability to issue notifications and has identified the organisations or individuals that need to be notified.

5.11 Applicants for a range control licence that wish to be licensed to issue notifications will have to demonstrate to the regulator that they have the capability to do so in a timely fashion and that they can provide all relevant information to those who need to be notified. For example, if it is necessary to notify airspace users of a restriction of use of a specific area of airspace, the organisation issuing the notification will need to provide information in the appropriate way to airspace users. The applicant should consider notification of all potentially impacted parties: it is recommended that applicants review best practice in other range control operations globally to determine what may be possible and appropriate to provide as a notification to the general public or other interested parties.

5.12 The application should set out a plan of notifications, covering:

- the organisations and individuals that will need to be notified ahead of launch
- what systems and procedures the applicant proposes or already has in place to issue and verify notifications to these parties

5.13 The applicant should set out information and communication systems to be used, including interface checks, software quality assurance, and procedural logic that will be used to ensure successful notifications.

5.14 [Annex A](#) gives some examples of notifications.

Notifying land users

5.15 The Regulations contain a requirement to notify users of land connected with or close to the launch operation. The Regulations draw a distinction between:

- people or organisations who have an interest in the land area, such as a local authority or emergency services
- people unconnected with the launch operation but who need to be warned of any hazards in an area they might enter, such as the general public

- 5.16 For local authorities and emergency services, the method and timing of notification, and the detail required, will differ from location to location. The regulator will look for evidence that the applicant has identified the required bodies, made contact with them, and understood what is required.
- 5.17 For owners or occupiers of the land, the regulator will look for evidence that the appropriate people and means of communication have been identified.
- 5.18 For people unconnected with the launch operation, the regulator will look for evidence that the applicant has considered an effective method for achieving this, such as general information issued on a public website or through local media. See also the separate section on boundary control below.

Boundary control

- 5.19 As part of the identification of the designated range for a spaceflight operation, [regulation 47](#) requires a range control licensee to identify which areas of the range will be identified as hazard areas, and how these hazard areas are to be managed. This comprises exclusion, restriction or warning zones as defined in regulation 47 and detailed in section 4 of this guidance.
- 5.20 The exact boundaries and levels of restriction will be determined by the launch operator licensee's safety case, based on the level of risk that the launch activity presents, including key events such as rocket stage separation. For example, areas near the launch site may be at sufficient risk to require active measures for exclusion to ensure safety, whereas areas further downrange which are less likely to be occupied might be at a lower level of risk, so could be dealt with through issuing of warnings such as NOTAMs.
- 5.21 The details of a specific launch operation may not be available at the time of range control licence application. Therefore, the regulator will look for evidence that the applicant has the capability to manage boundaries of the range in the ways that are required by the type of operation they are proposing. Both the level of restriction and the type of environment will need to be considered.
- 5.22 Note that some areas may also require measures to be in place for the purposes of security in addition to, or instead of, safety. For further guidance on this, see the [Guidance on security matters for applicants and licensees](#).

Example

Ground – for some operations, the launch hazard area will be contained within the boundary of the launch site, in which case the perimeter security around the launch site such as fences and security personnel may be sufficient to control the boundary. In others, where the launch hazard area extends beyond the spaceport area, boundary control might be achieved using a combination of signs, flags, security personnel, and road closures.

Air – it is expected that the majority of air traffic, having received notification, will avoid the launch site during the launch operation. However, the launch operator licensee's safety case might define that an area needs to be subject to active surveillance, and the range control service provider might use radio communications through the ANSP to attempt to contact any potential intruders to

instruct them to avoid entering hazard areas. For downrange hazard areas, the safety case may define that the risk is low enough for notification to be sufficient.

Sea – for the marine environment, the approach is likely to follow a similar method as for aviation, with the level of control defined by the launch operator licensee’s safety case. If a boundary requires active exclusion, a range control service provider might use patrol boats, surveillance planes, or warning buoys.

Monitoring (tracking & surveillance)

5.23 Applicants that intend to provide monitoring services – that is, tracking and surveillance of spacecraft, space objects, carrier aircraft and other potential range users within the range – must demonstrate their capability to do so as part of their application.

5.24 The regulator will expect applicants to provide detailed information about:

- the concept of operation and techniques the applicant will use to provide these services
- the equipment they intend to use, identifying any previous experience of this equipment performing similar operations
- the personnel who will undertake these tasks, any relevant experience and their qualifications

5.25 For equipment, the applicant should set out detailed technical information including:

- the overall operational concept – what outcomes the system aims to achieve and how the different sub-systems interface to achieve this; identifying why this concept and the selected equipment is appropriate for the activities proposed
- details of the models of equipment, how many of each, and where they are proposed to be located in relation to other identified spaceflight components (e.g. the launchpad)
- the maximum and minimum capabilities of tracking and surveillance equipment, including:
 - accuracy and latency
 - graphics to display coverage areas, and where any expected hazard areas fall within this coverage, if known
 - details of the analysis used to inform these graphics – for example, link budget analysis or using the radar equation in some form of integrated model which considers vehicle aspects, and any relevant assumptions; clear indication of different sources of information for inputs, including where this has been provided by a third party
- the compatibility the tracking equipment has with different types of launch vehicles, identifying the technique(s) to be used and any differences of interface
- an analysis of external factors which may affect the capabilities, such as meteorological conditions or geographical features
- any software that is used as part of the system
- any inputs or assumptions that the capability of the system is dependent on
- detail of the heritage of any software, i.e. where it has been used in similar situations in the past, and the experience that proposed range control personnel have in using this software
- for all major systems, the verification and validation of the system should be detailed, including the test methods, approach to verification by analysis and the calibration plan

for these systems. Where these systems are readily commercially available, the applicant provide suitable evidence from the supplier details of any other licences held or engagement in progress with other regulatory bodies in support of the provision of these services for e.g. Ofcom for spectrum compatibility

- 5.26 For personnel, in particular those with roles that are involved in managing safety and risk, the applicant is expected to highlight the requirements and responsibilities of these roles and what experience the personnel will have.

Additional range functions

- 5.27 Applicants that intend to provide the additional functions set out below will need to provide information about their capabilities. These functions are not categorised specifically as range control services under the Act, but may be provided using equipment operated or personnel employed by the range control service provider as agents of another licensee:

- providing meteorological data such as weather forecasts
- non flight safety telemetry information
- flight termination

- 5.28 The applicant should set out detailed technical information, including where applicable:
- the overall operational concept – the role to be carried out and how it will be done
 - details of the techniques to be used to perform meteorological forecasting and the equipment to perform this
 - details of the techniques to be used to provide non flight safety telemetry services and the equipment to perform this
 - details of the techniques to be used to send flight termination functions and the equipment used to perform this
 - the maximum and minimum performance characteristics of the equipment, including coverage maps and details of how these were generated, models used to calculate coverage, parameters used and values chosen, as well as any assumptions used in making these calculations
 - the compatibility of any termination or telemetry system with expected launch vehicles
 - details of the personnel who will undertake these tasks and their experience and qualifications
 - details of any other licences held or engagement in progress with other regulatory bodies in support of the provision of these services for e.g. Ofcom for spectrum compatibility

Other information about the applicant's organisation

- 5.29 The applicant must provide the regulator information about their organisation as set out in section 4 of this guidance:
- the management structure and the details of personnel in prescribed roles
 - details of their safety management and quality management systems

Section 6: The range control licensee's role in the launch operation

6.1 This section outlines and clarifies several points on the integration between the range control licensee's operation and the operations of the other licensees.

Who is in charge of safety in a launch operation?

6.2 Overall responsibility for conducting safe launch operations rests with the launch operator licensee, as the owner of the safety case. Range control services are likely to be a key element of this safety case, and function as mitigations to the risks posed by the launch, such as conducting surveillance or clearance of areas which are more likely to contain hazards.

6.3 No separate safety case is required for the range control licensee. However, applicants for a launch operator licence must provide, in their safety case, details of the range control services that will be needed for the proposed spaceflight activities. Section 5 of the document Guidance for launch operator and return operator licence applicants and licensees provides more detail on the information that must be included in the launch operator's safety case.

6.4 From the point of view of an applicant for a spaceflight operator licence (launch or return), the process of deciding which range control services are needed starts with the flight safety analysis (regulation 26) part of the safety case. The required attributes of a range control service most obviously fall under the requirements of the step at regulation 28(f) as it relates to the flight safety analysis. This step requires an applicant to define any appropriate measures to take to prevent a major accident occurring, and mitigate the consequences if a major accident does occur. An applicant must also define appropriate performance standards for the measures (some of which will include range control services) and decide what mechanisms to use for reviewing those measures.

6.5 In carrying out the flight safety analysis and the various steps within it, the applicant must take into account the matters listed in paragraph 18(2) of Schedule 1 including:

- the applicant's own and any proposed range control service provider's capabilities in:
 - tracking
 - telemetry
 - communications
- how any flight safety system will be activated if its activation is necessary
- how the applicant will coordinate and communicate with air traffic control service providers, meteorological information providers and emergency services
- any legal requirements relevant to the applicant's proposed use of airspace

6.6 The range control licensee is responsible for ensuring that the services it provides are provided safely, and to the standard required by the launch operator licensee's safety case.

6.7 The launch operator licensee is required to produce a safety operations manual, which will contain the information, procedures and instructions necessary for staff involved in the spaceflight activity to carry out their duties. Some of these duties will include coordination and communication with range control facilities and range control licensee personnel and include procedures involving the range control licensee when:

- deciding to commence a launch, and

- during each phase of the flight of a launch vehicle (e.g. tasks where range control licensee personnel will play a key role such as range clearance or range monitoring)
- 6.8 The safety operations manual must also record any tasks that fall to range control licensee personnel arising from the range control licensee's agreements with relevant organisations, such as liaising with the ANSP during the operation to ensure that airspace restrictions are being complied with.
- 6.9 Similarly, the launch operator licensee's safety management system must clearly reflect any roles and responsibilities that fall to range control licensee personnel.

Is a range control licensee required to develop a safety case?

- 6.10 No, the Regulations do not place a legal duty on a range control licensee to prepare a separate safety case focused only on its licensed activities. The rationale for this approach is that the range control licensee's activities do not primarily present hazards in themselves, but instead function as safety mitigations for hazards created by other licensees. Therefore, the legal duty to provide a safety case is owed by the launch or return operator, and the mitigations provided by range control service providers are considered as part of that overall safety case for the operation.
- 6.11 The Regulations do however place a legal duty on the range control licensee to prepare and maintain an effective safety management system to manage safety in its day-to-day operations, as well as a quality management system to ensure the quality of safety-critical services is maintained.
- 6.12 The Regulations do not prevent a range control licensee from developing and maintaining its own safety case, if it wishes to do so as part of its overall approach to safety.

At what point do the range control licensee's responsibilities end?

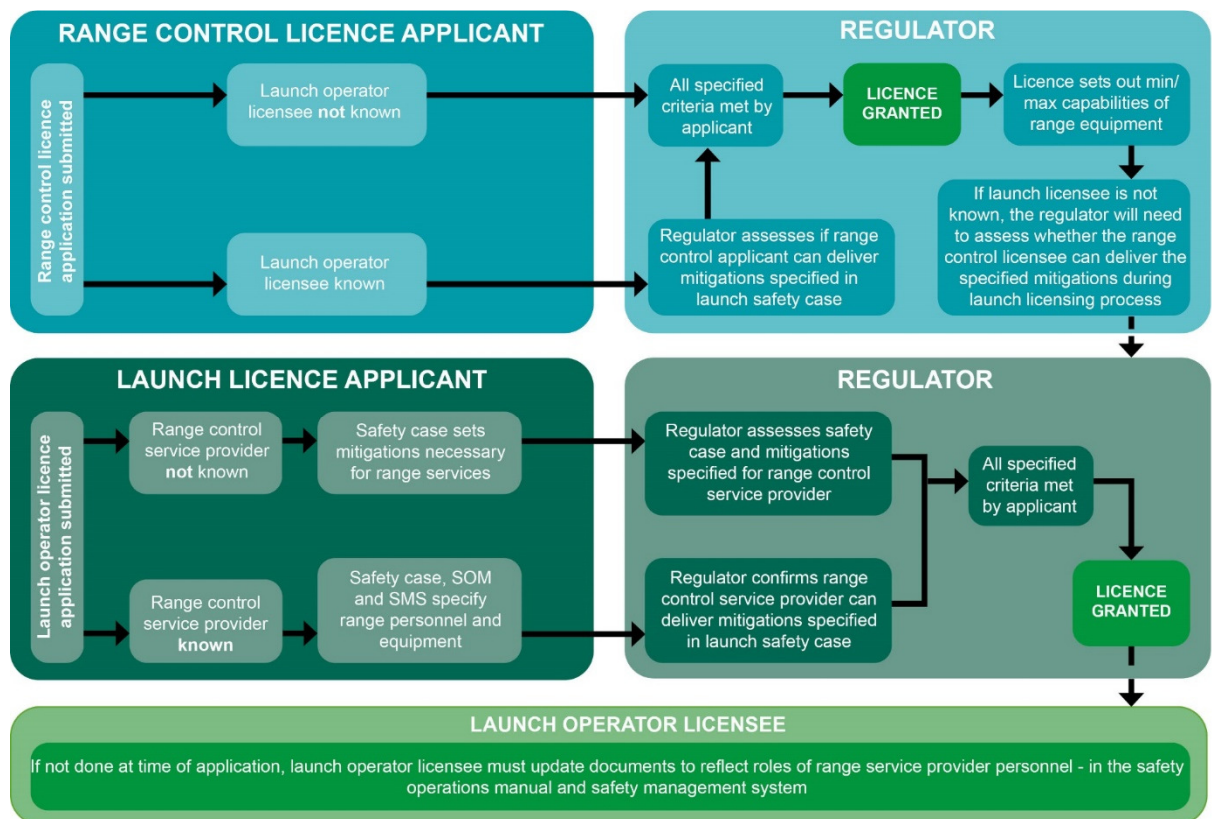
- 6.13 The Regulations do not set out a specific point at which the range control licensee's responsibility ends (e.g. once the launch vehicle has reached a certain altitude or a certain phase of the mission). This is because this will vary between missions and be dependent on the characteristics of the launch and launch vehicle.
- 6.14 The Regulations do not require that the exact size, shape and internal characteristics (e.g. limit lines or number and location of hazard areas) be defined at time of licensing. This is because these will vary between missions and be dependent on the characteristics of the launch and launch vehicle.
- 6.15 In practice, the launch or return operator safety case will define the requirements of the range control services for a particular mission, and the range control licensee will set out how its operation will meet the mission requirements. Section 5 of the guidance for launch or return operators sets out what is required in a safety case submitted by a launch or return operator.
- 6.16 Regulation 46 places a requirement on the range control licensee to provide details of the designated range (i.e. the range for a particular mission) ahead of the launch or return

operation, as opposed to at the time of applying for a licence. This is outlined further in paragraphs 4.10-4.15 of this guidance.

Can a range control service provider be licensed separately to a launch operator?

- 6.17 The Regulations allow a range control service provider to be licensed to provide services without a specific launch or launch operator licensee being identified. The range control licensee can establish its operation, and then negotiate with one or more launch operators in order to provide range control services to them. Alternatively, a range control service provider may have identified a specific launch operation that it wishes to provide services for when applying for a licence.
- 6.18 If a launch operator licensee decides to change to a new range control service provider after the launch operator licence has been granted, the launch operator licensee must review and revise its safety case as set out in [regulation 80](#). The proposed range control licensee will be required to provide such information as is necessary for the regulator to assess whether the services it provides will meet the requirements of the safety case, including the technical capabilities of range equipment such as radar, and roles and responsibilities of range control service provider personnel within the launch operation.
- 6.19 This will also require the revision of the launch operator licensee's safety operations manual to reflect the roles of range control licensee staff and functions within the launch operator licensee's operation.
- 6.20 Figure 2 shows the sequencing of the elements of the licensing processes.

Figure 2: The sequencing of the licensing processes



Is flight termination provided by the launch operator or range control licensee?

- 6.21 Regulation 89 sets out that if a spaceflight operator who holds a launch operator licence intends to use a launch vehicle with a non-autonomous flight safety system, it must appoint flight termination personnel. Regulation 100 sets out that the spaceflight operator must monitor the flight (including the launch) of a launch vehicle in real time, so that it is aware immediately if that vehicle malfunctions. The same regulation also sets out parameters in which the appointed flight termination personnel must make a decision to terminate the flight.
- 6.22 In practice, the flight termination personnel may be employed by the range control licensee rather than the spaceflight operator; for example, if the range control licensee's equipment is being used to monitor the craft and transmit the termination signal, their personnel may be most qualified to fill this role. This will be a decision made by the spaceflight operator, where it can demonstrate under section 3(4) that the personnel are acting as agents of the spaceflight operator. Under regulation 92, the spaceflight operator must appoint such people as flight termination personnel and supply them with the required training described at Part 1 to Schedule 3. Alternatively, the spaceflight operator may have personnel in its organisation specifically trained to fulfil this function.
- 6.23 Under paragraphs 18 and 19 of Schedule 5, the spaceflight operator has an obligation to set out instructions and procedures in the safety operations manual concerning flight termination decisions and various aspects of the use of any flight safety system.

Are range control services licensed to be provided from a fixed geographical location?

- 6.24 Range control services are generally provided using fixed ground-based tracking and surveillance equipment stationed permanently at or near the launch site. However, other methods exist, such as mobile or transportable monitoring equipment, or satellite-based capability.
- 6.25 The Regulations do not prescribe that range control services should take any particular form, rather they require that the licensee must have the capabilities in place which are necessary to provide the range control services required to support a particular launch. This framework allows for a licence to be granted for a range control service provider that aims to provide services to launches from more than one location, or employ range control equipment that is not based in a single, fixed location.
- 6.26 In these cases, the regulator will need to carry out further assessments to confirm that the licensee's capabilities are maintained to the same level from the site of the designated range, once this has been identified. For example, if an organisation is licensed to provide tracking services using a transportable radar, once the site has been identified the regulator will need to confirm that geographical features, such as mountains, do not affect coverage.

Can more than one range control licensee operate from the same site?

- 6.27 Yes. The Regulations do not prohibit more than one range control licensee from operating from the same site at different times. For example, a launch operator might want to bring in equipment more suited to provide range control services for its launch vehicle, rather than using existing equipment located at a spaceport.
- 6.28 Under these circumstances, the regulator may wish to carry out further reviews or impose licence conditions to ensure that the presence of more than one range control service provider at a site does not compromise the effectiveness of the services in ensuring safety. The regulator will assess this as part of the launch or return operator's safety case, so the range control licensee should aim to identify any potential conflicts at this stage.
- 6.29 Sections 5 and 7 of the [Guidance for launch operator and return operator licence applicants and licensees](#) sets out the circumstances under which the launch or return operator's safety case must be prepared or reviewed:
- If an operator is applying for a licence, the suitability of the range control services is assessed as part of the application
 - If an operator already holds a licence but is proposing to work with a new range control service provider, this will trigger a review of the safety case, as set out in section 7 of the [Guidance for launch operator and return operator licence applicants and licensees](#)
- 6.30 Although in practice more than one launch will not be going ahead from the same site at the same time, the range control licensee should consider any elements of another licensee's operation which could affect its ability to provide its services, including:
- technical issues, such as use of radio frequencies or locations of key equipment
 - procedural issues, such as ensuring external organisations are aware who is operating the range and who the points of contact are

- relationships with other licensees involved in the launch or return operation, such as ensuring alignment of safety management systems

6.31 The regulator may wish to impose additional licence conditions such as preventing a licensee from using frequencies to test equipment at certain times if this interferes with safety-critical services provided by another licensee.

Who is responsible for controlling the boundaries of the spaceport site?

6.32 The Regulations place a requirement on the range control licensee to protect the boundaries of hazard areas that have been identified, which may include areas of land around the launch site. [Regulation 37](#) may also require a spaceport licensee to establish a safety clear zone around a spaceport. Further details on the safety clear zone for spaceports can be found in the [Guidance for spaceport licence applicants and licensees](#).

6.33 The presence of a range control licensee's operation does not remove the safety clear zone requirement from the spaceport licensee.

Can the same organisation hold a range control and launch operator licence?

6.34 The Regulations do not place a prohibition on the same organisation holding licences both to conduct spaceflight activities and provide range control services. However, as range control services are a safety-critical activity, it is important that the range control function retains a degree of independence from some other elements of the launch operation.

6.35 [Regulation 54](#) applies where a spaceflight operator is authorised by a licence to provide range control services for spaceflight activities which it is conducting. It requires the spaceflight operator to have a number of measures in place to ensure that the parts of the organisation providing the range control services are sufficiently distinct to ensure that the functions remain independent, including management systems, lines of communication, and processes to ensure safety concerns are addressed.

Can a range control licensee sub-contract another organisation to provide elements of its services?

6.36 There may be instances where a range control licensee wishes to bring in another organisation to provide an element of the range control service, on an agency basis. This could occur, for example, if the safety case for a particular launch required surveillance of a hazard area downrange where the licensee would not usually provide this.

6.37 As set out in paragraphs 3.21-3.25 above, the Act allows this approach, under [section 7\(3\)](#):

"A person does not require a range control licence to provide, as employee or agent of another person, range control services the provision of which is authorised by a range control licence granted to that other person."

6.38 The services provided must still be authorised by the range control licence, and therefore the regulator may need to carry out assessments to confirm that the organisation who is appointed to provide such services as agent of the range control licensee possesses the capability to provide the particular services that the licence authorises.

Annex A – examples of notifications

Example 1: Notice to Airmen

It is anticipated that any Notice to Airmen (NOTAM) will be issued as far in advance of launch as possible.

The following is a generic example of the expected types of information to be included in the NOTAM which should be communicated through the appropriate and identified channels. This includes both through the national NOTAM channels and through other communication channels as identified in the notification planning.

The expected format and content of a NOTAM is dependent upon the proposed activity. However, as a minimum, it should include a description of the activities to be conducted, the identified hazard areas, the expected timings of activation of these areas and contact details for the range control service provider. An example of this may be as follows:

- A. Launch Site Name*
- B. Launch Site Location. Lat/Long (degrees & decimal minutes).*
- C. Activated Co-ordinates Lat/Long (degrees & decimal minutes) From *time/date local*
- D. Activated Co-ordinates Lat/Long (degrees & decimal minutes) To *time/date local*
- E. Description of launch vehicle, expected trajectory. Generic Activity Description. Range Contact Details xyz@email.com / Phone Number / Radio Frequency on Day*

Please engage with the Civil Aviation Authority and NATS to find further information on Notice to Airmen.

Example 2: Radio Navigational Warning and Notice to Mariners

It is anticipated that any Radio Navigational Warnings and Notice to Mariners will be issued as far in advance of launch as possible.

The following is a generic example of the expected types of information which will need to be included in the Radio Navigational Warnings and Notice to Mariners which should be communicated through the appropriate and identified channels at least 2 months in advance. This includes both through the national Radio Navigational Warnings and Notice to Mariners channels and through other communication channels as identified in the notification planning.

The expected format and content is dependent upon the proposed activity. However, as a minimum, it should include a description of the activities to be conducted, the identified hazard areas, the expected timings of activation of these areas and contact details for the range control service provider. An example of this may be as follows:

- A. Launch Site Name*
- B. Launch Site Location. Lat/Long (degrees & decimal minutes)*
- C. Activated Co-ordinates Lat/Long (degrees & decimal minutes) From *time/date local*
- D. Activated Co-ordinates Lat/Long (degrees & decimal minutes) To *time/date local*

E. Description of launch vehicle, expected trajectory. Generic Activity Description (with an image on a nautical chart). Expected impact on shipping. Range Contact Details xyz@email.com / Phone Number / Radio Frequency on Day

Please engage with the Maritime and Coastguard Agency to find further information on Radio Navigational Warnings and Notice to Mariners.