

# Future Flight Systems – Acceptable means of compliance to UK Specific Operations Risk Assessment (SORA) for Uncrewed Aircraft Systems (UAS) – Guide

March 2025 Version 1



BSI Flex 1906 v1.0:2025-03

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# Foreword

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## Presentational conventions

The guidance in this document is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

*Additional commentary, explanation and general informative material is presented in smaller italic type.*

Where words have alternative spellings, the preferred spelling of the *Shorter Oxford English Dictionary* is used (e.g. "organization" rather than "organisation").

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# Introduction

In the UK, the Specific Operations Risk Assessment (SORA) methodology is due, in 2025, to become an Acceptable Means of Compliance (AMC) to Article 11: Rules for conducting an operational risk assessment as laid out in UK Regulation (EU) 2019/947 [1].

Amongst the SORA requirements, some specifically call for the use of a standard or other means of compliance (MoC) acceptable to the CAA. In many instances, a specific standard or MoC has not yet been identified in UK SORA.

The main objective of this BSI Flex is to identify and simplify references to standards and MoC where these are specifically required in UK SORA and within the scope defined below. To achieve this, it draws largely upon the technical assessment of standards already conducted as part of Project Shepherd (2021-2024)<sup>1)</sup> and focuses on how those results relate specifically to the requirements relevant to the scope of this BSI Flex.

This BSI Flex also considers MoC which have previously been developed by the European Aviation Safety Agency (EASA) as an Acceptable Means of Compliance (AMC) to requirements in the EASA version of SORA (where they are broadly similar to UK SORA requirements for a standard or MoC).

Where standards or MoC are not available, gaps have been identified in order to highlight where additional material should be developed. From the perspective of an applicant for a SORA based operational authorization, this could mean that the applicant proposes an MoC to the CAA. From a regulator or standards body perspective, this could mean areas for development of new standards or MoC to fill the existing gaps.

It is intended that readers of this BSI Flex will make reference to the CAA UK Specific Operations Risk Assessment (UK SORA) methodology [N1] for descriptions of the SORA methodology and the referencing/requirement code system developed by the UK CAA.

Future iterations of this BSI Flex may incorporate updated or newly developed standards and MoC, and may broaden the scope of the BSI Flex to include requirements for higher Specific Assurance and Integrity Levels (SAIL).

---

<sup>1)</sup> See Section 4.4 for a description of Project Shepherd

# 1 Scope

This BSI Flex gives guidance on standards relevant to specific assurance or integrity requirements described in the UK CAA implementation of the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) Specific Operations Risk Assessment (SORA) version 2.5.

This BSI Flex covers:

- a) Operational Safety Objectives (OSOs) which refer to a requirement for a standard as a means of compliance (up to robustness levels consistent with SAIL 3). This includes:
  - 1) OSO 2 – UAS manufactured by competent and/or proven entity;
  - 2) OSO 3 – UAS maintained by competent and/or proven entity;
  - 3) OSO 8 – Operational procedures are defined, validated and adhered to OSO 16 – Multi crew coordination; and
  - 4) OSO 16 – Multi crew coordination.
- b) Containment requirements which refer to a requirement for a standard as a means of compliance. Specifically containment requirements for medium or high robustness levels.
- c) Ground Risk Class (GRC) mitigations which refer to a requirement for a standard as a means of compliance. Specifically M2 – Effects of UA impact dynamics are reduced; and
- d) Functional Test-Based (FTB) methods which refer to a requirement for a standard as a means of compliance.

This BSI Flex does not cover:

- SORA requirements that do not specify standards as a means of compliance;
- OSO robustness levels for SAIL scores higher than 3;
- air risk; or
- all legal aspects and requirements relevant to uncrewed aircraft systems (UAS).

This BSI Flex is primarily for use by legislators, regulators, insurers and organizations involved in uncrewed aircraft systems operations, technologies and infrastructure, as well as aircraft manufacturers.

This BSI Flex may also be of use to the wider UK-based future flight ecosystem.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions, or limits the application, of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- [N1] UK CIVIL AVIATION AUTHORITY (UK CAA). *AMC1 to Article 11 of Assimilated Regulation (EU) 2019/947* (UK SORA)

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in BSI Flex 1903 v2.0:2024-06 and the following apply.

#### 3.1.1 assurance

level of verification required by the competent authority prior to granting an approval. All the integrity requirements [should] still be fulfilled by the UAS Operator

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms [2]. Edition 2.5, modified – “but the Verification of the implementation can happen prior to approval or after in auditing” removed based on UK CAA guidance; “must” revised to “should”}

#### 3.1.2 certification

form of recognition in accordance with this Regulation {Regulation (EU) 2018/1139 [3]}, based on an appropriate assessment, that a legal or natural person, product, part, non-installed equipment, equipment to control unmanned aircraft remotely, aerodrome, safety-related aerodrome equipment, ATM/ANS system, ATM/ANS constituent or flight simulation training device complies with the applicable requirements of this Regulation and of regulations made under it, through the issuance of a certificate attesting such compliance

{SOURCE: UK Regulation (EU) 2018/1139 [3]}

#### 3.1.3 component

self-contained part, combination of parts, subassemblies, or units which perform a distinct function necessary to the operation of the system

{SOURCE: UK CAA CAP 722D:2024 [4]}

#### 3.1.4 configuration

requirements, design and implementation that define a particular version of a system or system component

{SOURCE: UK CAA CAP 722D:2024 [4]}

#### 3.1.5 configuration control

process of evaluating, approving or disapproving, and coordinating changes to configuration items after formal establishment of their configuration identification

{SOURCE: UK CAA CAP 722D:2024 [4]}

#### 3.1.6 ConOps

describes the characteristics of the organization, system, operations and the objectives of the user

{SOURCE: UK CAA CAP 722D:2024 [4]}

#### 3.1.7 contingency procedures

planned course of action designed to help an organization respond effectively to a significant future event or situation that may or may not happen

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.8 critical area

ground area where persons would be expected to be impacted by the UA in the event of a loss of control or an unplanned landing

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms. Edition 2.5 [2]}

### 3.1.9 emergency procedures

procedures that are executed by the Uncrewed Aircraft (UA) pilot in command or by the aircraft to mitigate the effect of failures that cause or lead to an emergency condition

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.10 emergency response plan (ERP)

plan of actions to be conducted, in a certain order or manner, in response to an emergency event

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.11 failure

event which affects the operation of an item such that it can no longer function as intended

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.12 failure condition

condition having an effect on the UAS, both direct and consequential, which is caused or contributed to by one or more failures. Where relevant, a failure condition should consider flight phases (Take-off, climb, cruise, descent, approach, landing), adverse operational conditions, adverse environmental conditions, or external events where they may trigger, contribute to, or worsen the effect of the failure condition

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.13 failure mode

way an item fails to perform its intended function, i.e. the externally observable manifestation of the item failure

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.14 ground risk buffer

area over the surface of the earth, which surrounds the operational volume and that is specified in order to minimize the risk to third parties on the surface in the event of the unmanned aircraft leaving the operational volume

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.15 hardware

object that has physical being. Generally, refers to line replaceable units (LRUs), circuit cards, power supplies etc

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.16 hazard

condition, object or activity with the potential of causing injuries to personnel, damage to equipment or structures, loss of material or reduction of ability to perform a prescribed function

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.17 human error

human action with unintended consequences

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.18 human factors (HF)

human-machine interface issues with UAS control station displays, controls, functionality, automation, operator workload and system maintainability

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.19 incident

occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.20 integrity

attribute of a system or an item indicating that it can be relied upon to work as expected

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms. Edition 2.5 [2]}

### 3.1.21 loss of control of the operation

situations where: outcome of the situation highly relies on providence; or cannot be handled by a contingency procedure

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms. Edition 2.5 [2]}

### 3.1.22 maintenance

inspection, overhaul, repair, preservation and the replacement of parts

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.23 malfunction

occurrence of a condition whereby the operation is outside specified limits

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.24 manufacturer

natural or legal person who manufactures a product or has a product designed or manufactured and markets that product under their name or trademark

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.25 occurrence

safety-related event which endangers or which, if not corrected or addressed, could endanger an aircraft, its occupants or any other person and includes in particular an accident or serious incident

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.26 operational volume

combination of the flight volume and the contingency volume

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.27 operator

legal or natural person operating or intending to operate one or more UAS

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.28 operational authorization

document issued by the CAA that authorizes the operation of an unmanned aircraft system, subject to the conditions outlined within the authorization, having taken into account the operational risks involved

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.29 parachute

device used or intended to be used to retard the fall of a body or object through the air

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.30 population density

number of people living per unit of an area (e.g. per square mile); the number of people relative to the space occupied by them

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.31 procedure

standard, detailed steps that prescribe how to perform specific tasks

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.32 process

set of inter-related resources and activities, which transform inputs into outputs

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.33 reliability

probability that an item will perform a required function under specified conditions, without failure, for a specified period of time

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.34 risk

measure of exposure to a possible hazard and it combines the severity of the consequences at the realisation of the hazard (how bad) and the likelihood of suffering those consequences (how often)

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.35 robustness

property of mitigation measures and OSOs resulting from combining the safety gain provided by the mitigation measures and the level of assurance and integrity that the safety gain has been achieved

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms. Edition 2.5 [2]}

### 3.1.36 safety

safety is the state in which the risk of harm to persons or property is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.37 severity

consequence or impact of a hazard's effect or outcome in terms of degree of loss or harm

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.38 software

computer programs, procedures, rules, and any associated documentation pertaining to the operation of a computer system

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.39 specific category

UAS operations for which an Operational Authorization is required to be issued by the CAA pursuant to Article 12 of UK Regulation (EU) 2019/947 [1], or an Authorization received in accordance with Article 16 of UK Regulation (EU) 2019/947 [2]

{SOURCE: UK CAA CAP 722D:2024 [4] modified – “in the “Specific” category”}

### 3.1.40 specific operations risk assessment

methodology to guide both the applicant and the competent authority in determining whether a UAS operation can be conducted in a safe manner

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms. Edition 2.5 [2]}

### 3.1.41 standard

published document established by consensus and approved by a recognized body that sets out specifications and procedures to ensure that a material, product, method or service meets its purpose and consistently performs to its intended use

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.42 system

combination of inter-related items arranged to perform a specific function(s)

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.43 testing

process of operating a system under specified conditions, observing or recording the results, and making an evaluation of some aspect of the system

{SOURCE: UK CAA CAP 722D:2024 [4]}

### 3.1.44 validated

term used to describe controls/safety requirements that are unambiguous, complete, and verifiable

{SOURCE: JARUS guidelines on SORA, Annex I, Glossary of Terms. Edition 2.5 [2]}

## 3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

|       |                                                      |
|-------|------------------------------------------------------|
| AEH   | airborne electronic hardware                         |
| AG    | advisory group                                       |
| AMC   | acceptable means of compliance                       |
| CAA   | Civil Aviation Authority                             |
| CM    | certification memorandum                             |
| DAL   | development assurance levels                         |
| EASA  | European Union Aviation Safety Agency                |
| ERP   | emergency response plan                              |
| ETSO  | European technical standard order                    |
| FAA   | Federal Aviation Administration                      |
| FHA   | functional hazard assessment                         |
| FMEA  | failure modes effect analysis                        |
| FTB   | functional test based                                |
| GM    | guidance material                                    |
| GMM   | general maintenance manual                           |
| GRC   | ground risk class                                    |
| ICA   | instructions for continued airworthiness             |
| IR    | implementing regulation                              |
| JARUS | Joint Authorities for Rulemaking on Unmanned Systems |
| kg    | kilogram                                             |
| lbs   | pounds                                               |
| METAR | meteorological aerodrome report                      |
| MoC   | means of compliance                                  |
| MTOM  | maximum take-off mass                                |
| OSO   | operational safety objective                         |
| RPAS  | remotely piloted aircraft system                     |
| SAIL  | specific assurance and integrity level               |
| SC    | special condition                                    |
| SI    | supplementary instructions                           |
| SORA  | specific operations risk assessment                  |
| sUAS  | small uncrewed aircraft system                       |
| SW    | software                                             |
| TAFOR | terminal aerodrome forecast                          |
| UA    | uncrewed aircraft                                    |
| UAS   | uncrewed aircraft system                             |

## 4 Method

### 4.1 General

This BSI Flex has been developed following the steps described in 4.2 to 4.7.

### 4.2 Step 1: Identification of relevant requirements

The Advisory Group (AG) reviewed the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) SORA version 2.5 [2] in order to identify where requirements within the scope of this BSI Flex specifically call for the use of standards considered adequate by the competent authority and/or in accordance with means of compliance (MoC) acceptable to that authority.

In March 2025, the UK CAA published the first edition of AMC1 to Article 11, Conducting a UK Specific Operation Risk Assessment (UK SORA) [N1] for public consultation. Although not identical to JARUS SORA 2.5 [2], UK SORA is based upon it and includes requirements which specifically call for the use of a standard or MoC acceptable to the CAA.

Whilst the AG initially based their analysis on JARUS SORA [2], this was subsequently updated in order to reference UK SORA described in AMC1 to Article 11 [N1].

The OSO's, Containment, Mitigation and FTB sections shown in the Requirements section are based on the results of Step 1. Table 1 indicates the items included within the scope of this BSI Flex.

**Table 1 – SORA items included within BSI Flex 1906**

| SORA item | CAA reference Code | Level at which reference to a standard or means of compliance acceptable to the CAA is a requirement | Within scope of the BSI Flex (Y/N) |
|-----------|--------------------|------------------------------------------------------------------------------------------------------|------------------------------------|
| OSO 1     | NA                 | NA                                                                                                   | NA                                 |
| OSO 2     | OSO2.L.A           | SAIL 3 or above                                                                                      | Y                                  |
| OSO 3     | OSO3.C1.M.A        | SAIL 3 or above                                                                                      | Y                                  |
| OSO 4     | OSO4.L.I           | SAIL 4                                                                                               | N                                  |
| OSO 4     | OSO4.M.I           | SAIL 5                                                                                               | N                                  |
| OSO 4     | OSO4.H.I           | SAIL 6                                                                                               | N                                  |
| OSO 5     | OSO5.M.A           | SAIL 4 or above                                                                                      | N                                  |
| OSO 5     | OSO5.H.I           | SAIL 5 or above                                                                                      | N                                  |
| OSO 6     | OSO6.M.A           | SAIL 4 or above                                                                                      | N                                  |
| OSO 7     | NA                 | NA                                                                                                   | NA                                 |
| OSO 8     | OSO8 M.A           | SAIL 3 or above                                                                                      | Y                                  |
| OSO 9     | NA                 | NA                                                                                                   | NA                                 |
| OSO 10    | NA                 | NA                                                                                                   | NA                                 |

Table 1 – SORA items included within BSI Flex 1906 (*continued*)

| SORA item                                                                                                                                                                                                                                                                               | CAA reference Code | Level at which reference to a standard or means of compliance acceptable to the CAA is a requirement | Within scope of the BSI Flex (Y/N) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------|------------------------------------|
| OSO 11                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 12                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 13                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 14                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 15                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 16                                                                                                                                                                                                                                                                                  | OSO16C1.M.A        | SAIL 3 or above                                                                                      | Y                                  |
| OSO 16                                                                                                                                                                                                                                                                                  | OSO16C3.H.I        | SAIL 5 or above                                                                                      | N                                  |
| OSO 17                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 18                                                                                                                                                                                                                                                                                  | OSO18.M.A          | SAIL 4 or above                                                                                      | N                                  |
| OSO 19                                                                                                                                                                                                                                                                                  | OSO19.M.I          | SAIL 4 or above                                                                                      | N                                  |
| OSO 20                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 21                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 22                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 23                                                                                                                                                                                                                                                                                  | NA                 | NA                                                                                                   | NA                                 |
| OSO 24                                                                                                                                                                                                                                                                                  | OSO24.H.I          | SAIL 4 or above                                                                                      | N                                  |
| Containment                                                                                                                                                                                                                                                                             | COR C4.M.I         | Medium or high robustness                                                                            | Y                                  |
| Containment (tether)                                                                                                                                                                                                                                                                    | COT C2.M.A         | Medium or high robustness                                                                            | Y                                  |
| M1A                                                                                                                                                                                                                                                                                     | NA                 | NA                                                                                                   | NA                                 |
| M1B                                                                                                                                                                                                                                                                                     | NA                 | NA                                                                                                   | NA                                 |
| M1C                                                                                                                                                                                                                                                                                     | NA                 | NA                                                                                                   | NA                                 |
| M2                                                                                                                                                                                                                                                                                      | M2C2.M.A           | Medium or high robustness                                                                            | Y                                  |
| M2                                                                                                                                                                                                                                                                                      | M2C1.H.A           | High robustness                                                                                      | Y                                  |
| FTB                                                                                                                                                                                                                                                                                     |                    | General                                                                                              | Y                                  |
| <p><b>NOTE</b></p> <p>Y = Yes, this requirement is included in the scope of the BSI Flex</p> <p>N = No, this requirement is not included in the scope of the BSI Flex</p> <p>NA = Not Applicable, there is no standard required and it is not included in the scope of the BSI Flex</p> |                    |                                                                                                      |                                    |

## 4.3 Step 2: Assessment of cover required

Where requirements for a standard or MoC were identified, these were assessed by the AG from the perspective of coverage (i.e. what should be addressed by the standard or MoC).

The results of Step 2 are shown in the coverage tables for each of the identified UK SORA requirements.

## 4.4 Step 3: Review of Project Shepherd

Commissioned by EASA, the research project titled Shepherd (hereafter referred to as Project Shepherd) conducted an extensive technical assessment of relevant standards previously identified in the AW-Drones research project, with a view to identifying which standards, or parts of standards, could be recommended for use, or not recommended for use, when addressing requirements contained in:

- a) SORA v2.5 [2], published by JARUS for external consultation in December 2022, or in several specific instances the latest available draft at the time the research was undertaken.

***NOTE 1** The finalized version of JARUS SORA v2.5 had not been published prior to the completion of Project Shepherd.*

- b) EASA Special Condition (SC) Light-UAS Medium (December 2022) [5] and EASA Special Condition (SC) Light-UAS High Risk (December 2021) [6]; and Commission Implementing Regulation (EU) 2021/664 on a regulatory framework for the U-space [7].

Project Shepherd mapped the relationship between standards and requirements working from the perspective of the standard towards the requirements (i.e. one standard might address several requirements across more than one of the three areas described above).

Project Shepherd's results were published by EASA in the following documents:

- a) SHEPHERD D1.1-D1.2 – Industry standards assessment criteria and work methodology, September 2022 [8];
- b) SHEPHERD D2.1-D3.1 – Identification of satisfactory industry standards and justification for not acceptable industry standards, April 2023 [9];
- c) SHEPHERD D2.2-D3.2 – Identification of satisfactory industry standards and justification for not acceptable industry standards, April 2024 [10]; and
- d) SHEPHERD D4.3 – Final report, April 2024 [11].

Step 3 involved a review of the Project Shepherd results in order to assess their relevance and present them in a simplified way specifically in the context of UK SORA requirements.

***NOTE 2** Project Shepherd commenced in May 2022 and concluded in April 2024. Several of the assessed standards have, since that project was completed, been either updated or withdrawn (this is especially relevant to the research presented in D2.1-D3.1).*

In instances where a standard has been withdrawn, it has not been included in this BSI Flex.

In instances where a standard has been superseded by a newer version, these have been included in the further reading sections of this document.

***NOTE 2** The UK Specific Operations Risk Assessment (UK SORA) methodology, Annex E introduction describes the adoption of standards to be used as acceptable means of compliance (AMC) and specifically recognizes the following documents for consultation:*

- JARUS SORA 2.5 (where comments identify standards to be used as AMC) [2];
- SHEPHERD D2.1-D3.1 [9]; and
- SHEPHERD D2.2-D3.2 [10].

*The results of Step 3 are shown in the Summary of Project Shepherd sections for each of the identified UK SORA requirements.*