Australian Government
Civil Aviation Safety Authority

TEMPORARY MANAGEMENT INSTRUCTION

RPA Operations over or near people - 2024-01

April 2024

Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to Elders past, present and emerging.

Inside front cover artwork: James Baban.

References

Acronyms

The acronyms and abbreviations used in this TMI are listed in the table below.

Table 1. Acronyms

Acronym and abbreviation	Description
AIS	Abbreviated Injury Scale
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations 1998
EASA	European Union Aviation Safety Agency
ERP	Exemption Review Panel
GNSS	Global Navigation Satellite System
JARUS	Joint Authorities on Rulemaking for Unmanned Systems
OONP	Operations over or near people
OSO	Operational Safety Objective
RPA	Remotely Piloted Aircraft
SAIL	Specific Assurance Integrity Level
SORA	Specific Operations Risk Assessment
TMI	Temporary Management Instruction
UAS	Unmanned Aircraft System
VLOS	Visual line of sight

Note: This document contains references to the JARUS SORA methodology which uses the term UAS in lieu of RPA. References to UAS should be read as RPA.

Definitions

Terms that have specific meaning within this TMI are defined in the table below.

Table 2. Definitions

Term	Definition
Active participant	A person who is participating directly in the activity to which the RPA is operated. *Note: The scope of persons who may be an active participant is broader than the scope of persons 'directly associated with the operation of the RPA' under CASR 101.245 and may include persons such as performers and emergency services personnel.*
Controlled environment	An area where no persons other than active participants and RPA crew are permitted and that has access control to prevent third party entry.
Emergency services operation	An RPA operation conducted solely for: • law enforcement purposes; or • the purpose of saving or protecting persons, property, or the environment.
Emergency services organisation	Any of the following: • the Australian Federal Police • the Australian Defence Force • the Australian Maritime Safety Authority • the Australian Border Force • a State or Territory police service • a State or Territory fire service • a State or Territory emergency service • a State or Territory parks, wildlife, or forestry service • a State or Territory surf lifesaving service
Sheltering	The use of a structure or barrier to physically segregate a person from an RPA.

Reference material

The reference material used in this TMI are listed in the table below.

Table 3. Reference material

Document type	Title
ASTM Standard F3322-18	Standard Specification for Small Unmanned Aircraft System (sUAS) Parachutes
EASA MOC Light-UAS.2512-01	Means of Compliance with Light-UAS.2512 / Means of compliance with SORA M2 (medium robustness)
JARUS Document JAR_doc_09	JARUS SORA Package
Part 101 of CASR	Unmanned aircraft and rockets
Protocol LEG.002	CASA Exemptions

Revision history

This version of the TMI is approved by the Branch Manager, Emerging Technologies and Regulatory Change.

Revisions to this TMI are recorded below in order of most recent first.

Table 4. Revision history

Version number	Date	Parts and sections	Details
1.1	April 2024	All	Amended text for external publication purposes. Inserted data collection and reporting requirements.
1.0	March 2024	All	Initial issue

1 Introduction

1.1 Purpose

This TMI specifies the CASA policy to support processing applications for the approval of RPA operations over or near people (OONP) for the purposes of regulation 101.245 and 101.280 of CASR.

Feedback from CASA staff on the direction and efficiency of this TMI will be reviewed and considered with a view to further developing OONP legislative requirements.

1.2 Background

There are presently three distinct rules that govern operations over or near people:

- Direction 7 of CASA 22/22 - prescribes requirements for the operation of RPA or model aircraft near people. Under this rule, an RPA must not operate within 30 metres of a non-involved participant measured from the point on the ground directly below the RPA. The consequence of this construction is that the height of the RPA is irrelevant.

- Regulation 101.245 of CASR – like Direction 7 detailed above; however, this rule measures the 30-metre distance from the RPA's position, creating a sphere where people are not to be located. The rule includes a reduction of the distance to 15 metres where a ReOC holder obtains consent from the person.

- Regulation 101.280 of CASR – prescribes requirements for operations over populous areas, simplified as an area within the vicinity of the RPA that contains a person where the RPA would pose an unreasonable risk to the person or their property upon impact. The relevant area is generally significantly larger than those covered under Direction 7 and regulation 101.245 of CASR, considering the transit of the RPA in an abnormal state.

CASA is empowered to approve operations near people for the purposes of Direction 7 of CASR 22/22 and regulation 101.245 of CASR. CASA is empowered to approve operations for the purposes of regulation 101.280 of CASR for certified RPA only, which are not presently available in Australia. For non-certified RPA, CASA is limited to the issue of an exemption.

Guided by global best practice and in consideration of the nuances of the Australian domestic operational and regulatory environment, CASA has formalised its policy on approving operations over or near people. Operations that meet the requirements of this policy are eligible for the issue of an approval, for the purposes of Direction 7 of CASA 22/22 and regulation 101.245 of CASR, and an exemption from the requirements of regulation 101.280 of CASR.

Note: Compliance with the TMI does not exempt the populous area requirements detailed in regulation 101.280 of CASR. An exemption to subregulation 101.280 (2) of CASR will be required when the operation is conducted in a populous area.

1.3 Applies to

This TMI applies to CASA Officers assessing applications by ReOC holders (the operator), and validating related data, for RPA operations over or near people. The OONP approval pathways identified in this TMI are not intended for model aircraft operations or RPA operations that are conducted outside of a ReOC.

This TMI does not apply to operations conducted by ReOC holders within 30 metres but no closer than 15 metres of a person in accordance with subregulation 101.245 (3) of CASR.

2 Instruction

This TMI provides three pathways for authorisation of RPA operations over or near people. An operation that meets the requirements and criteria of these pathways is generally eligible for an approval for the purposes of subregulation 101.245 (5) and, where required, an exemption for the purposes of subregulation 101.280 (2) of CASR.

The TMI outlines the pathway, assessment criteria, standards and process CASA has adopted to review OONP operation applications. Approval of an operation that does not meet the requirements of a defined pathway must meet an acceptable level of safety and be approved by the Executive Manager, National Operations and Standards and Executive Manager, Regulatory Oversight Division. Please see section 6 Approvals outside of defined pathways.

This TMI does not remove the requirement for compliance with CASA's exemption process detailed in LEG.002 and the functions of the CASA Exemption Review Panel (ERP).

3 Pathway 1 - Informed consenting active participants

RPA operations over or near active participants may be approved where:

- the operation is conducted in a controlled environment;
- the operation is conducted by the holder of a ReOC;
- the RPA weighs no more than 25 kg; and
- active participants provide written consent for operations within 30 metres.

Prior to providing written consent, each active participant must be verbally briefed, in a language that the participant understands, on the following:

- a minimum of 30 m horizontal separation between the RPA and a person is normally required;
- when the potential impact energy transfer from the RPA to a person is greater than 34 joules, there is a **significant risk** of **serious injury** or **fatality** from the RPA in the event of an impact;
- the proposed RPA flight paths;
- the emergency procedures and emergency response plan;
- the safety mitigators that are implemented to control harm and risk; and
- the right not to consent to the operation near the person.

The written consent must include a declaration the active participant has been verbally briefed, is aware of the risks including the possibility of fatality and agrees to comply with any instruction from the remote pilot.

Active participants must be at least 18 years of age at the time of providing consent.

Note: The operator must have documented practices and procedures that detail how it will comply with the requirements of Pathway 1, including the process for briefing active participants, and obtaining and retaining consent documentation.

The operator is required to define the personnel that will provide the briefing and the training to the active participants. The personnel must have appropriate experience to ensure the briefing is adequate.

Consent cannot be provided on behalf of a person. A person under the age of 18 cannot be an active participant. Persons with a temporary or permanent mental impairment may not have capacity to provide informed consent.

While adults should be assumed to have capacity, the operator should have an appropriate method for ensuring that consent is not accepted from a person lacking capacity. A person with capacity will understand and retain the information relevant to the decision; understand the choices and the related consequences; will weigh up the consequences of the choices and will communicate a decision freely and voluntarily.

4 Pathway 2 – Unlikely to cause serious harm upon impact

RPA operations over or near people may be approved where the potential impact energy transfer is not greater than 15 joules subject to compliance with the conditions detailed below.

The maximum energy transfer permitted under Pathway 2 must be demonstrated based on the likely RPA impact trajectories, including reasonable abnormal situations. The calculation will usually require a combination of both vertical and horizontal kinetic energy.

Unless opposing evidence is provided, it will be assumed that all kinetic energy from an RPA is transferred to a person upon impact. Where an operator provides evidence that a collision will result in transferred energy less than the assumed energy transfer (e.g. due to frangibility), the provided data is to be validated by CASA's Airworthiness and Engineering Branch (AEB).

Operations that require the implementation of specific mitigators to ensure the RPA remains below the maximum energy thresholds, such as the use of a parachute or imposed speed restrictions, are limited to ReOC holders.

4.1 Protection from laceration

Operations near people within a 1:1 ratio (see Note below) must not occur with an RPA that has exposed rotating parts that would lacerate human skin upon impact. Operations that incorporate a parachute system that stops propeller rotation upon parachute activation are taken to meet this requirement.

Note: A 1:1 ratio means the RPA is operating within the same distance of a person horizontally and vertically. For example, an RPA cannot be operated within 10 metres measured horizontally from a person when the RPA is 10 metres above the person.

RPA operated within 15 metres horizontally of a person must not be operated at a height less than 3 metres above the height of the person unless:

- the RPA has no exposed rotating parts that would lacerate human skin upon impact; or
- the RPA has a functional obstacle avoidance system that restricts the RPA from operating within 5 metres horizontally of the person.

4.2 Reduction of kinetic energy to meet maximum impact energy threshold

Parachutes that are compliant to the performance standard outlined in ASTM F3322-18 (Standard Specification for Small Unmanned Aircraft System (sUAS) Parachutes) may be employed as an energy reduction system to meet the maximum allowable potential impact transfer energy requirement.

A reduction of RPA speed to reduce the maximum potential impact energy is generally permitted, however:

- speed restriction shall be set to prevent the remote pilot from operating faster than the restricted speed, without an intentional overriding action (such as activation of a mode change switch); and

- an RPA energy assessment considers the most probable failure modes (which includes loss of GNSS when operating in an environment where signal interruption or position error is probable, such as in a city or indoor environment).

4.3 Use of sheltering to meet maximum impact energy threshold

Sheltering may be used to meet the maximum allowable potential impact transfer energy where:

- the RPA weighs not more than 25 kg;
- the operator declares that operations are conducted over a controlled environment where there is no potential for a person to exit the structure during operations and be exposed to potential impact transfer energy above the permitted maximum; and
- the operator declares the shelter is of such construction ensuring that, should the RPA penetrate the structure upon impact, the residual potential impact transfer energy from the RPA, or any debris is less than the specified maximum.
- moving vehicles must not be used as shelter unless:
  - the vehicle is travelling at speeds less than 50 km/hr; or
  - the driver has provided informed consent.

4.4 Operations where consent is obtained

The maximum impact energy under Pathway 2 **may be increased to 34 joules (from 15 joules)** where informed consent from persons has been obtained.

Prior to providing informed consent (required under this pathway for an RPA greater than 15 joules unless undertaking an emergency services operation), the consenting person must be briefed by the operators' personnel on the following:

- the proposed RPA flight paths;
- the risk to life, including details of potential injury probability and severity;
- emergency procedures and response plan;
- the safety mitigators that are implemented to control harm and risk;
- the right to not consent to the operation near the person.

To meet the threshold for 'informed consent', the consenting person must have sufficient capacity to fully understand the items listed in the briefing and make appropriate, unimpaired, decisions.

Note: There is no requirement for written consent under Pathway 2, however the operator should have documented practices and procedures that detail how persons will be adequately briefed prior to providing informed consent and record how consent was obtained. The operator should have a method to ensure the consenting person/s has sufficient mental capacity at the time of providing consent and throughout the operation.

The operator should define who can provide the briefing ensuring personnel hold appropriate experience required to ensure the briefing is adequate.

Consent under Pathway 2 can be given on behalf of a person by their legal guardian and therefore there is no age limit on informed consenting persons. Operations involving minors or persons with reduced capacity have a higher risk profile and the operator should have a documented procedure to address this.

While adults should be assumed to have capacity, the operator should have an appropriate method for ensuring that consent is not accepted from a person lacking capacity (in which case consent would need to be obtained from the person's legal guardian). A person with capacity will understand and retain the information relevant to the decision; understand the choices and related consequences; will weigh up the consequences of the choices and will communicate a decision freely and voluntarily.

4.5 Emergency services operations

The maximum impact energy under Pathway 2 **may be increased to 34 joules (from 15 joules)** where the operation is an emergency services operation conducted by an emergency services organisation in accordance with the requirements of Pathway 2. The increase of energy permitted under this section **does not extend** to operations conducted by third parties on behalf of an emergency services organisation.

Note: Emergency services operators may have alternate operational avenues under Pathway 1 or 3 depending on the specifics of the operation.

5 Pathway 3 – SORA based assessments

RPA operations assessed under the JARUS SORA methodology with a final SAIL of **not greater than 4** may be approved to operate over or near people where the requirements of Pathway 3 are met.

Where a SORA assessment for a proposed operation requires an operator to meet a medium ('M') or high ('H') level of robustness for an airworthiness-related operational safety objective (specifically, OSO's #02, #04, #05, #06, #10, #12, #13, #18, #19, #20, #24), this element of the SORA application must be validated by CASA's Airworthiness and Engineering Branch (AEB). In performing validation, AEB may employ qualitative or quantitative methods as appropriate, to verify the operator's claimed level of robustness for airworthiness OSO's.

Table 5. Table of airworthiness-related OSO's for JARUS SORA 2.0 - based applications

		SAIL LEVEL					
OSO	**Description**	**I**	**II**	**III**	**IV**	**V**	**VI**
OSO#02	UAS manufactured by competent and/or proven entity (design)	O	O	L	M	H	H
OSO#04	UAS developed to authority-recognised design standards	O	O	L	M	M	H
OSO#05	UAS is designed considering system safety and reliability	O	O	L	M	H	H
OSO#06	C2/C3 link performance	O	L	L	M	H	H
OSO#10	Safe recovery from a technical issue	L	L	M	M	H	H
OSO#12	UAS designed to manage the deterioration of external systems	L	L	M	M	H	H
OSO#13	External services supporting UAS operations	L	L	M	H	H	H
OSO#18	Automatic protection of the flight envelope	O	O	L	M	H	H
OSO#19	Safe recovery from human error	O	O	L	M	M	H
OSO#20	A human factors evaluation	O	L	L	M	M	H
OSO#24	Adverse environmental conditions	O	O	M	H	H	H

Note: SORA provides a ground risk reduction in the Intrinsic UAS Ground Risk Class table for VLOS operations on the basis that when operating VLOS, the remote crew will see and avoid areas of higher risk. Where the ground risk classification is based on VLOS, the operator should have a tactical deconfliction scheme to ensure:

- the remote crew members observe the majority of the overflown areas during the operation, and identify area(s) of higher and lower risk on the ground; and

- the remote pilot will reduce the number of people at risk by adjusting the flight path while the operation is ongoing (e.g., flying away from the area with a higher risk on the ground or overflying only the identified area(s) of less risk on the ground).

5.1 M1 mitigation using sheltering

A person in a vehicle is not considered sheltered where the vehicle is not an enclosed protective structure (for example, a person on a motorcycle is not sheltered) or where the vehicle is travelling more than 60 km/hr.

Sheltering must not be used as a SORA M1 ground risk mitigator where the operational volume and ground risk buffer contains areas where there is likely to be a gathering of people that are not under shelter (such as schools, shopping areas, recreational areas).

Note: The application of this requirement means that where there is an area of a higher likelihood of exposed persons within the operational volume and ground risk buffer, the operator must either demonstrate that it can be reasonably assumed that persons will be sheltered during the time of the operation (such as a school during class hours where students will be in a class room, a closed shopping area at night), or exclude those areas from the operation and provide an operational buffer of at least 1:1.

5.2 M2 Mitigation

SORA M2 (**medium** robustness) ground risk mitigation may be used where the operator demonstrates compliance in accordance with EASA document MOC Light-UAS.2512-01: Means of Compliance with Light-UAS.2512 / Means of compliance with SORA M2 (medium robustness) “M2 MoC”.

SORA M2 (**high** robustness) ground risk mitigation may be used where:

- the demonstrated impact energy transfer is not more than 15 joules, and the RPA does not contain any exposed rotating parts that would lacerate human skin upon impact with a human being; or

- the likelihood of an AIS 3 or above injury from impact of the RPA with a person, including contact with exposed rotating parts is not greater than 1%.

M2 mitigation claims at a medium or high level of robustness require validation by CASA's Airworthiness and Engineering Branch (AEB).

Note: The restriction on the use of SORA M2 mitigators does not prohibit approval of a SORA-based operation using an RPA with the potential for serious laceration or fatality to be conducted over people, as long as the SORA target level of safety is met.

6 Approvals outside of defined pathways

Approvals for OONP RPA operations that do not meet the requirements or conditions outlined in any of the three pathways will require specific approval by the Executive Manager, National Operations and Standards (EM NOS) and the Executive Manager, Regulatory Oversight Division (EM ROD).

This includes operations assessed under Pathway 3 (SORA-based assessment) that has a final SAIL of 5 or more, and other OONP operations that fall outside the scope of Pathway 1, Pathway 2, and operations where the SORA methodology may not be the most appropriate risk assessment methodology to evaluate the proposed operation.

Applications that meet these criteria are to be referred to the CASA RPAS Inspector, Complex Applications.

7 Data collection and reporting requirements

All OONP approval instruments should include data collection and reporting requirements to enable CASA to assess the adequacy of the controls contained the OONP policy.