Australian Government
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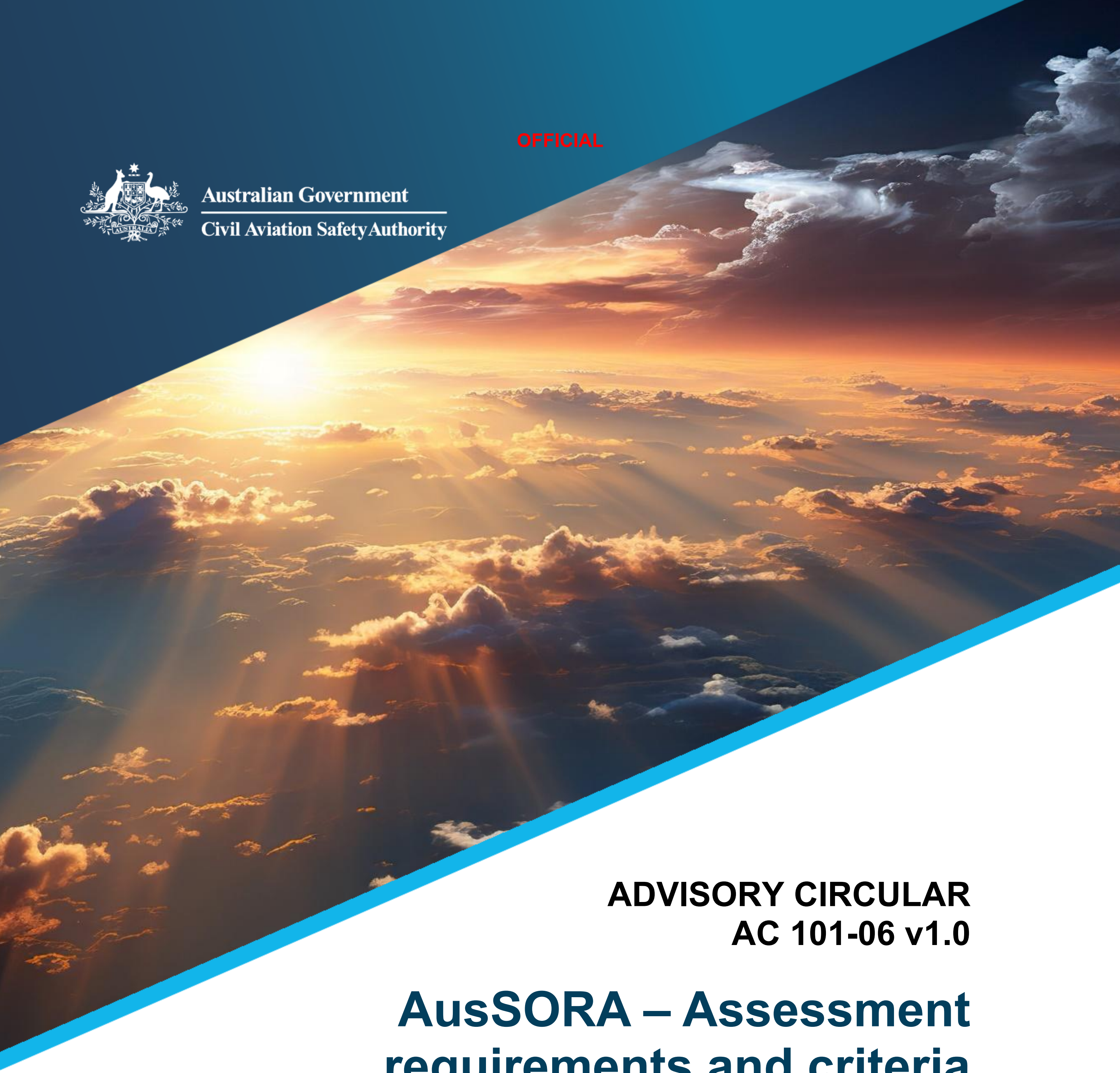

ADVISORY CIRCULAR
AC 101-06 v1.0

AusSORA – Assessment requirements and criteria

File ref: D26/114200

April 2026

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.

Artwork: James Baban.

Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- remotely piloted aircraft (RPA) operator's certificate (ReOC) holders and applicants
- remote pilots (RePL) and other remote crew members
- other support personnel involved in remotely piloted aircraft systems (RPAS) operations.

Purpose

This AC replaces TMI 2024-03 by adopting and adapting elements of the JARUS SORA 2.5 framework to the Australian regulatory context, updating assessment processes and CASA's approach to ground risk, containment, and application of AusSORA.

For further information

For further information or to provide feedback on this AC, visit CASA's contact us page.

Status

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

Table 1: Status

Version	Date	Details
v1.0	April 2026	Initial AC. This AC replaces TMI 2024-03.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material

1.1 Acronyms

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

Table 2: Acronyms

Acronym	Description
ABS	Australian Bureau of Statistics
AGL	Above ground level
BVLOS	Beyond visual line of sight
CASA	Civil Aviation Safety Authority
CASR	Civil Aviation Safety Regulations 1998
CV	Contingency volume
fGRC	Final ground risk class
GRB	Ground risk buffer
iGRC	Intrinsic ground risk class
JARUS	Joint Authorities on Rulemaking for Unmanned Systems
NAA	National Aviation Authorities
OSO	Operational safety objective
RPA	Remotely piloted aircraft
RPAS	Remotely piloted aircraft system
SAIL	Specific assurance and integrity level
SORA	Specific Operations Risk Assessment
TMI	Temporary management instruction
VLOS	Visual line of sight

1.2 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Table 3: Legislation references

Document	Title
Part 101 of CASR	Unmanned aircraft and rockets

Other references

Table 4: Other references

Document	Title
JARUS Document Package JAR_doc_09	JARUS SORA Package
JAR-DEL-SRM-SORA-MB-2.5	JARUS guidelines on Specific Operations Risk Assessment
JAR-DEL-SRM-SORA-B-2.5	JARUS guidelines on SORA Annex B - Integrity and assurance levels for the mitigations used to reduce the intrinsic Ground Risk Class
JAR-DEL-SRM-SORA-E-2.5	JARUS guidelines on SORA Annex E - Integrity and assurance levels for the Operational Safety Objectives (OSO)
JAR-DEL-SRM-SORA-F-2.5	JARUS guidelines on SORA Annex F - Theoretical Basis for Ground Risk Classification and Mitigation
JAR-DEL-WG6-D.04 (Version 2.0 Main Body document)	JARUS guidelines on Specific Operations Risk Assessment (Version 2.0)
JAR-DEL-WG6-D.04 (Annex C)	JARUS guidelines on SORA Annex C - Strategic Mitigation Collision Risk Assessment
JAR-DEL-WG6-D.04 (Annex D)	JARUS guidelines on SORA Annex D - Tactical Mitigation Collision Risk Assessment
TMI 2024-03	Temporary Management Instruction SORA 2.0 ground risk assessment – requirements and alternate criteria – 2024-03

2 Introduction

2.1 Purpose

AC 101-06 replaces TMI 2024-03[1] and provides guidance on the Australian specific operation risk assessment (AusSORA) when used by industry, and by CASA for application assessment, under Part 101 of CASR.

AusSORA incorporates and adapts elements of the JARUS SORA 2.5 framework to the Australian operational and regulatory context.

AC 101-06 replaces the JARUS SORA document suite to the extent detailed in the AC, for application of the SORA methodology in Australia. It provides assessment processes, criteria, and methods that replace or supplement relevant sections of the JARUS material where necessary to suit Australian requirements. AC 101-06 outlines CASA's approach to ground risk, containment, and assessment criteria, ensuring consistent application of the SORA methodology for remotely piloted aircraft (RPA) operations in Australia while maintaining alignment with the overarching principles of the JARUS SORA framework. It also sets out CASA's approach to transition to AusSORA.

AC 101-06 will commence on 11 May 2026 to give new applicants an opportunity to develop their applications to meet the requirements of the AC. Applications submitted after the implementation of AC 101-06 will need to apply the methodologies, assumptions, definitions, and acceptance criteria described in AC 101-06.

Feedback from CASA staff on the direction and efficiency of AC 101-06 will be reviewed and considered, with a view to further developing the requirements related to the application of the SORA methodology in Australia.

2.2 Background

The Joint Authorities for Rulemaking on Unmanned Systems (JARUS) released SORA version 2.5 (SORA 2.5) in mid-2024. CASA initially adopted the highest-value elements of SORA 2.5 for early implementation and published TMI 2024-03, which provided an alternative ground risk class assessment method compatible with SORA version 2.0 applications.

Although SORA 2.5 introduced greater granularity in population density bands, some Australian operating environments still fell below the lowest population densities defined in the SORA 2.5 framework. An updated intrinsic ground risk class (iGRC) table in TMI 2024-03 addressed this gap by introducing an additional population density band that is one order of magnitude lower than those included in the SORA 2.5 iGRC table[2].

In addition, TMI 2024-03 split operational scenarios into visual line of sight (VLOS) and beyond visual line of sight (BVLOS), this was to account for the reduction to the iGRC when operating VLOS. This mitigation is now provided as guidance within the iGRC table (Table 6) of AC 101-06.

AC 101-06 retains the grid resolution table from TMI 2024-03. The grid resolution table may be used for all AusSORA based applications.

AC 101-06 also introduces CASA's approach to adjacent area calculation and containment determination. SORA 2.5 provides two methods for determining the required level of containment. After consideration of the Australian context, impost on industry and the proportionality of these two methods, elements of the process contained within Annex F of SORA 2.5[3] have been incorporated into the AusSORA containment methodology and are reflected in Instruction 3 of this AC.

[1] Temporary Management Instruction SORA 2.0 ground risk assessment –requirements and alternate criteria – 2024-03

[2] See page 34 of JARUS guidelines on Specific Operations Risk Assessment (JAR-DEL-SRM-SORA-MB-2.5)

[3] Annex F - Theoretical Basis for Ground Risk Classification and Mitigation (JAR-DEL-SRM-SORA-F-2.5)

AC 101-06 also includes the operational safety objective (OSO) robustness matrix and clarifies that AusSORA applications will be assessed considering the requirements in Annex E of SORA 2.5. [4] CASA has amended the robustness requirement for OSO #24 from high to medium for specific integrity and assurance level (SAIL) IV operations. The aim is to enhance flexibility by enabling RPAS manufacturers to demonstrate compliance to these requirements without requiring formalised environmental testing and evaluation typically required for type certified aircraft.

2.3 Application

Instruction 1 of this AC applies to all applicants and CASA officers using the SORA methodology to assess the ground risk of an RPA operation.

Instruction 2 of this AC applies to applicants who use the AusSORA iGRC (Table 6) and CASA Officers assessing the application.

If an applicant uses an M1 ground risk mitigation when using the AusSORA iGRC table (Table 6), they should use the AusSORA mitigating scoring table (Table 9), M1 integrity table (Table 10) and M1 assurance table (Table 11) in this AC.

Instruction 3 of this AC applies to applicants and CASA officers for the assessment of AusSORA applications.

This instruction establishes and details the containment model that CASA will use, including the population density function. The assessment of containment requirements will be conducted by CASA officers; applicants are not required to perform this assessment. Applicants may develop their own tools to assess containment requirements based on the method outlined in this instruction; however, CASA will continue to verify this component independently.

If additional containment controls are necessary, the CASA officer will determine these prior to raising the fee estimate and advise the applicant if further evidence is required. CASA will refer to Annex E of SORA 2.5,[5] when determining the integrity and assurance requirements for the required level of containment.

Instruction 4 of this AC applies to all applicants and CASA officers for the assessment of AusSORA applications.

The table identifies the robustness level for each OSO relative to the SAIL. CASA will consider Annex E of SORA 2.53 when determining the integrity and assurance requirements for each OSO.

Instruction 5 of this AC applies to all applicants and CASA officers for the assessment of AusSORA applications.

The table identifies the reference to assessment criteria and supporting material to be used for AusSORA applications and assessments.

Instruction 6 of this AC applies to all applicants and CASA officers for the assessment of AusSORA applications.

This section explains CASA's transitional approach to accepting applications based on previous versions of the SORA and TMI 2024-03.

[4] Annex E - Integrity and assurance levels for the Operational Safety Objectives (JAR-DEL-SRM-SORA-E-2.5)

[5] Annex E - Integrity and assurance levels for the Operational Safety Objectives (JAR-DEL-SRM-SORA-E-2.5)

3 Instructions

3.1 Instruction 1 – Grid resolution for determining the iGRC

To calculate the iGRC in Step #2 of SORA, maps with an appropriate grid size based on the operation, should be used when determining the population density. See **Table 5: Optimal grid resolutions**.

If mapping products do not exist for the required optimal grid size, the applicant may use the closest grid size available. For example, for an operation conducted at 400 ft AGL in an area where the only available data is the Australian Bureau of Statistics (ABS) population grid,[6] the applicant should use the ABS 1 km x 1 km grid squares and validate this data qualitatively to ensure an accurate assessment of population.

If the closest grid size available is smaller than the required optimal grid size in Table 5, the map may be smoothed to the required optimal grid size in Table 5. For example, for an operation conducted at 5,000 ft AGL in an area where the only available data is the ABS population grid, the applicant may use the average population density of a square, comprised of four of the 1 km x 1 km grid squares provided by the ABS.

Table 5: Optimal grid resolutions

Max. height (AGL)		Suggested optimal grid size (metre x metre)
Feet	**Metres**	
500	152	>200 x 200
1,000	305	>400 x 400
2,500	762	>1,000 x 1,000
5,000	1,524	> 2,000 x 2,000
10,000	3,048	>4,000 x 4,000
20,000	6,096	>5,000 x 5,000
60,000	18,288	>10,000 x 10,000

Note: The Australian Bureau of Statistics publishes population data at resolutions down to 1 km × 1 km grids. This is currently a publicly available dataset and will be used as the baseline for determining population density where a smaller, optimal grid resolution is suggested.

6 https://digital.atlas.gov.au/maps/digitalatlas::abs-australian-population-grid-2024/about

3.2 Instruction 2 – AusSORA ground risk class determination

AusSORA iGRC table

Applicants submitting AusSORA applications should use Table 6: AusSORA intrinsic ground risk class (iGRC) determination to determine the iGRC for their operation.

The formulas for critical area and iGRC values have been developed primarily for fixed and rotary wing RPA and do not specifically address lighter than air RPA, such as uncrewed airship. To determine the applicable column in Table 6, an applicant may provide evidence of the specific critical area calculated for a lighter than air RPA in accordance with Annex F of SORA 2.5.[7], or an alternate method documented within an application.

AusSORA population density definitions

Table 7: AusSORA ground risk class definitions, contains both qualitative and quantitative descriptors that apply to the population bands in the AusSORA iGRC table (Table 6).

The qualitative and quantitative descriptors in Table 7 are intended to be used in combination with Table 6 to ensure the most appropriate population density band is utilised. If there is a discrepancy between the population density data and the qualitative descriptor, CASA will generally use the qualitative assessment to determine the appropriate operational scenario in Table 6

AusSORA iGRC multirotor trade off table

Table 8: AusSORA iGRC multirotor trade-off can be used for any AusSORA application when intending to operate a multirotor RPA within the identified characteristic dimensions. The iGRC score will be determined using quantitative population density data as the primary metric when assessing applications that use Table 8. CASA has reviewed and validated the trade-off tables contained in Annex F of SORA 2.5.[8] Following this review, CASA has determined that the methodology and outcomes reflected in those tables do not align with CASA's regulatory settings in the Australian context.

RPA speed and dimension mismatch

If there is a mismatch between the maximum RPA characteristic dimension and the maximum speed identified in Table 6, applicants should select and use the higher iGRC value of either column.

Note: When a critical area reduction claim is made, substantiation of the claim should generally be aligned to JARUS document SORA 2.5 Annex F[7] and include appropriate evidence. A pre-application meeting should be requested prior to submitting an application which includes a critical area reduction claim.

AusSORA iGRC mitigations

For operations claiming a reduction to the intrinsic ground risk class – by limiting people exposed or present on the ground – Table 9 (AusSORA ground mitigation scoring), Table 10 (AusSORA M1 integrity) and Table 11 (AusSORA M1 Assurance) are to be used to identify the assessment criteria and requirements. iGRC mitigations may also be applied when using the multi-rotor trade-off (Table 8).

[7] Annex F - Theoretical Basis for Ground Risk Classification and Mitigation (JAR-DEL-SRM-SORA-F-2.5)

[8] Annex F - Theoretical Basis for Ground Risk Classification and Mitigation (JAR-DEL-SRM-SORA-F-2.5)

AusSORA iGRC table

Table 6: AusSORA intrinsic ground risk class (iGRC) determination

Intrinsic ground risk class					
Maximum RPA characteristic dimension[9]	**1 m**	**3 m**	**8 m**	**20 m**	**40 m**
Maximum speed[10]	25 m/s	35 m/s	75 m/s	120 m/s	200 m/s
Operational scenarios					
Controlled ground area	1	1	2	3	4
Isolated environment	1	2	3	4	5
Scarcely populated environment	2	3	4	5	6
Lightly populated environment	3	4	5	6	7
Sparsely populated environment	4	5	6	7	8
Suburban / low density metropolitan	5	6	7	8	9
High density metropolitan	6	7	8	9	10
Assemblies of people	8	Not part of SORA			

Visual line of sight operations

For operations conducted within visual line of sight (VLOS), one (1) point is automatically deducted from the iGRC determination, except where the operation is conducted in a controlled ground area or where the iGRC is already one (1) prior to the application of any mitigations.

Micro RPA iGRC

For RPA with a gross weight of not more than 250 grams, CASA accepts a maximum iGRC rating of 1 regardless of the operational scenario. However, additional operational conditions may still apply for specific approvals, such as requirements to mitigate laceration risks, etc.

[9] The maximum RPA characteristic dimension should be calculated as follows:

- wingspan for aeroplanes
- blade diameter for single rotor rotorcraft
- maximum distance between blade tips of opposite rotors for a multirotor rotorcraft.

[10] The maximum speed is the maximum possible commanded airspeed of the RPA, as defined by the designer/manufacturer. This is the maximum airspeed that can be commanded by the remote pilot.

AusSORA population density definitions

Table 7: AusSORA ground risk class definitions

Qualitative descriptors	Quantitative population value (persons per km^2)	Area description
Controlled ground area	N/A	Areas where the only people present are active participants (if any). Active participants are persons under the full control of the remote pilot who are fully aware of the risks involved with the RPAS operation and have accepted these risks. Active participants are informed on and able to follow relevant effective emergency procedures and/or contingency plans.
Isolated environment	< 0.5	Areas such as mountains, remote deserts, and large bodies of water, which generally contain few, if any, habitable dwellings, and where it is reasonably expected that people will rarely be present.
Scarcely populated environment	< 5	Areas such as forests, deserts, and large farm parcels, with limited habitable dwellings (approximately 1 small dwelling every square kilometre).
Lightly populated environment	< 50	Areas of small farms and residential areas with very large lot sizes (approximately 4 acres or larger).
Sparsely populated environment	< 500	Areas of homes or businesses, with large lot sizes (approximately 1 acre or larger).
Suburban / low density metropolitan environment	< 5,000	Areas of single-family homes on small lots, low-rise apartment complexes, and low-rise commercial buildings.
High density metropolitan environment	< 50,000	Areas of mostly large multistorey buildings, generally the downtown areas of larger cities.
Assemblies of people	> 50,000	Areas where there is a large gathering of people such as professional sporting events, large concerts, etc.

AusSORA iGRC multirotor trade off table

Table 8: AusSORA iGRC multirotor trade-off

Intrinsic ground risk class		
Maximum RPA characteristic dimension[11]	**2 m**	**6 m**
Maximum speed[12]	20 m/s	35 m/s
Trade off value -population density (ppl/km^2)^		
0.25	1	2
2.5	2	3
25	3	4
250	4	5
2,500	5	6
25,000	6	7
>25,000	8	Not part of SORA

^ The qualitative descriptors in AusSORA population density definitions

Table 7 will not be used for the reduced quantitative population density figures. The determination on the population density for this trade off table will be determined by the quantitative density figures. Additionally, controlled ground area is not considered as part of the multirotor trade-off table (Table D) as there is no ability to trade off a quantitative population figure for this operational scenario.

Visual line of sight operations

For any operation where the Remote Pilot is operating the RPA within visual line of sight, an automatic deduction of one (1) point is taken from the iGRC determination figure, except where the iGRC is already one (1) prior to the application of any mitigations.

Micro RPA iGRC

For RPA with a gross weight of not more than 250 grams, CASA accepts a maximum iGRC rating of 1 regardless of the operational scenario. However, additional operational conditions may still apply for specific approvals, such as requirements to mitigate laceration risks, etc.

[11] The maximum RPA characteristic dimension should be calculated as the maximum distance between blade tips for a multirotor.

[12] The maximum speed is the maximum possible commanded airspeed of the RPA, as defined by the designer/manufacturer. This is the maximum airspeed that can be commanded by the remote pilot.

iGRC mitigations

Table 9: AusSORA ground mitigation scoring

Mitigation sequence	Mitigations for ground risk	Robustness		
		Low/None	Medium	High
1	M1 - Strategic mitigations for ground risk	0: None -1: Low	-2	-3
2	M2 - Effects of ground impact are reduced	0	-1	-2

Emergency response plan

CASA has adopted the emergency response plan (ERP) requirements in accordance with SORA 2.5 Annex E[13]. An ERP will be required for any AusSORA application, and the ERP should align to the requirements in OSO #8 as prescribed in Annex E[8]. CASA has developed an emergency response plan template[14] for RPAS operators which may be used to develop a company ERP.

Table 10: AusSORA M1 integrity

Criteria	Level of integrity		
	Low	Medium	High
Criterion #1 (Definition of the ground risk buffer)	A ground risk buffer with at least a 1 to 1 rule[1].	Ground risk buffer takes into consideration: • Improbable[2] single malfunctions or failures (including the projection of high energy parts such as rotors and propellers) which would lead to an operation outside of the operational volume • Meteorological conditions (e.g. wind), • RPAS latencies (e.g. latencies that affect the timely manoeuvrability of the RPA) • RPA behaviour when activating a technical containment measure • RPA performance.	Same as Medium[3]

[13] Annex E - Integrity and assurance levels for the Operational Safety Objectives (JAR-DEL-SRM-SORA-E-2.5)

[14] https://www.casa.gov.au/emergency-response-plan-template

Criteria	Level of integrity		
	Low	Medium	High
Comments	[1] *If the RPA is planned to operate at an altitude of 150m, the ground risk buffer should be a minimum of 150m.*	[2] *For the purpose of this assessment, the term "improbable" should be interpreted in a qualitative way as,* *"Unlikely to occur in each RPAS during its total life but which may occur several times when considering the total operational life of a number of RPAS of this type".* [3]*The distinction between a medium and a high level of robustness for this criterion is achieved through the level of assurance.*	
Criterion #2 (Reduction of population at risk)	The applicant claims the at-risk population is lowered by at least 1 iGRC population band (~90%) due to: • persons not present at the time of the operations[4], and/or • persons in the area are adequately sheltered[5] from the RPA[6] at the time of the operations.	The applicant claims the at-risk population is lowered by at least 2 iGRC population bands (~99%) due to: • persons not present at the time of the operations[4], and/or • persons in the area are adequately sheltered[5] from the RPA[6] at the time of the operations.	The applicant claims the at-risk population is lowered by at least 3 iGRC population bands (~99.9%) due to: • persons not present at the time of the operations[4], and/or • persons in the area are adequately sheltered[5] from the RPA[6] at the time of the operations.
Comments	[4] *This can be achieved/ demonstrated by means of:* • *An analysis or appraisal of characteristics of the location (land use that relate to the presence of people, e.g., industrial area, urban park or shopping centres) and time of day or day of the week that would influence or limit the presence of people (e.g., weekend for industrial plants, night-time, time after opening hours of shops), AND/OR* • *Use of temporal density data (e.g., data from a supplemental data service provider) relevant for the proposed area. For higher integrity levels real time data will generally be required.* [5] *In general, it can be expected that RPA weighing 25 kg or less are not able to penetrate buildings except in rare cases where the RPA speed or building materials are unusual (tents, glass roofs, etc). In cases where a RPA is still able to penetrate a structure, sheltering may not be fully effective but can still offer a partial mitigation.* [6] *The effectiveness of sheltering will vary based on local conditions. The applicant should demonstrate that it is reasonable to consider that the claimed percentage of non-active participants will be located within a suitable structure during the time of the operations.*		

Table 11: AusSORA M1 assurance

Criteria	Level of assurance		
	Low	**Medium**	**High**
Criterion #1 (Definition of the ground risk buffer)	The applicant declares the required level of integrity is achieved[1].	The applicant has supporting evidence to claim the required level of integrity has been achieved. This is typically achieved by means of testing, analysis, simulation[2], inspection, design review or through operational experience.	The claimed level of integrity is validated by a competent third party.
Comments	[1] *Supporting evidence may or may not be available.*	[2] *When simulation is used, the validity of the targeted environment used in the simulation needs to be justified.*	*N/A*
Criterion #2 (Evaluation of people at risk)	The applicant declares the required level of population density reduction is achieved for the time of the operations. When sheltering is claimed: • For RPA with a maximum gross weight not more than 25 kg, the applicant declares the RPA is unlikely to penetrate the structures. • For RPA with a maximum gross weight more than 25 kg, the applicant provides evidence to support the claim. This is typically achieved by means of testing, analysis, simulation, inspection, design review or through operational experience.	The applicant has supporting evidence that the required level of population density reduction is achieved for the time of the operations. All mapping products, data sources and processes used to claim the reduced density of population at risk, are accepted by the competent authority. When sheltering is claimed to contribute to not more than 90% of the population reduction, and the RPA has a maximum gross weight not more than 25 kg, the applicant declares the RPA is unlikely to penetrate the structure. When sheltering is claimed to contribute to more than 90% of the population reduction, or for RPA with a maximum gross weight more than 25 kg, the applicant provides evidence the	Same as Medium

Criteria	Level of assurance		
	Low	Medium	High
		RPA is unlikely to penetrate the structures in the operating area. This is typically achieved by means of testing, analysis, simulation, inspection, design review or through operational experience.	

3.3 Instruction 3 – Adjacent Area and Containment Methodology

Containment summary

JARUS has published a number of containment methods within the SORA Main Body[15] and SORA 2.5 Annex F[16] documents. Harmonising SORA methodologies to be applicable globally is challenging, particularly given the unique characteristics and variability of ground risk considerations from country to country. To deliver a balanced and flexible methodology for Australia, CASA has adopted and implemented a containment method that aligns with the principles within SORA 2.5 Annex F[11]. In support of this alignment and approach CASA will not require applicants to conduct the containment assessment; this will be completed for each application by the CASA officer. The outcomes of the assessment may require further controls in limited circumstances and CASA will communicate with applicants to identify any further requirements prior to raising a fee estimate.

Weighted population density model for SORA containment

Within the JARUS SORA framework, the operation is assumed to have an expected loss-of-control rate, which corresponds directly with the Specific Assurance and Integrity Level (SAIL). This rate drives the mitigations needed to achieve the overall Target Level of Safety (TLOS). SORA defines a TLOS to people on the ground of one fatality per one million hours.

The SORA semantic model[17] identifies two key volumes beyond the intended operating area: the Contingency Volume (CV) and Ground Risk Buffer (GRB). These areas are designed to ensure that if a loss of control of the operation occurs, the RPA remains within an assessed and acceptably safe boundary.

At SAIL I and II, RPA technical systems are not assessed or scrutinised against design, manufacturing or reliability requirements (unless through the technical assessment of an M2 iGRC reduction); safety relies primarily on organisational structure, operational procedures and remote pilot competence.

As the SAIL increases, greater emphasis is placed on the technical robustness and integrity of the RPA system, leading to progressively lower assumed loss of control rates. The loss of control rate reduces by orders of magnitude, as the SAIL increases, e.g., a SAIL II operation is ten times more likely to have a loss of control event than a SAIL III, and a hundred times more likely compared to a SAIL IV. To derive specific requirements, SORA also estimates that one in every ten, loss of control of the operation events, would lead to an operation over the adjacent area.

[15] JARUS guidelines on Specific Operations Risk Assessment (JAR-DEL-SRM-SORA-MB-2.5)

[16] Annex F - Theoretical Basis for Ground Risk Classification and Mitigation (JAR-DEL-SRM-SORA-F-2.5)

[17] See page 22 of JARUS guidelines on Specific Operations Risk Assessment (JAR-DEL-SRM-SORA-MB-2.5)

Adjacent areas outside of the operational volume and ground risk buffer are not assessed during the ground risk assessment step of SORA. Therefore, comparatively, cases can exist where there is a significant difference in ground risk between the operational area and adjacent areas. For example, a SAIL II operation may border an area (the adjacent area) that, if operated within, would be considered SAIL IV or higher due to higher population density. The inverse can also occur, where the adjacent area represents lower risk, e.g., remote mining sites generally have a high population count with little to no population outside these areas for a significant distance. For these reasons, the containment requirements must be proportionate to the actual risks within the adjacent areas.

The assessment of risk for the adjacent area is directly linked to the operational/ flight range of the RPA from the point of take-off/launch. In addition, an equal probability of the RPA escaping the operational volume in any direction is applied, subsequently, defining the adjacent area range as a circular measure. CASA's approach to calculating the adjacent area determines the RPA's maximum effective range and defines an equal-radius adjacent area around the take-off point. Variability of RPA operations means there may be multiple take-off/ launch locations within an operational volume. The adjacent area will be calculated based on all identified take-off locations. In lieu of identified take-off locations, CASA will take a conservative approach and measure adjacent area from the edge of the defined flight geography.

Once the adjacent area has been determined the population density within the area is assessed. Unlike the intrinsic ground risk class assessment in SORA (step #2), the population assessment within the adjacent area is based upon a decaying population density function. It would be overly conservative to assess the adjacent area using the same method as the SORA ground risk class assessment. The decaying probability density function identifies the risk with regard to the population within each cell and overlays the probability of impacting that area. This results in areas further away from the take-off point representing lower risk, even if they have the same or more population than closer areas.

SORA addresses these situations by requiring containment mitigations, i.e., measures that ensure the RPA remains within the defined operational area and that any loss of control of the operation does not increase the overall risk beyond acceptable levels.

A final ground risk class is then determined and compared against the specific assurance and integrity level (SAIL). In some cases, the outcome will identify no additional containment measures are required. CASA will consider the JARUS SORA 2.5 Annex E[18] containment requirements when applying low, medium or high robustness.

This approach considers not only the potential range of the RPA but also how the probability of impact decreases with distance from the operational area. In other words, as the potential impact area expands with distance, the chance of impacting a specific location reduces. This captures both the endurance of a potential escape event over the flight duration and the geometric probability of impact.

The containment model that CASA has adopted aligns with the principles in Annex F[19], providing a flexible and scalable approach tailored to the Australian operating environment. The model quantifies the final ground risk class (fGRC) in the adjacent area, while incorporating a distance-based weighting that reflects the decreasing likelihood of impact.

By linking spatial population data (e.g. 1 km ABS population grids) with probabilistic ground risk concepts, this model produces a decaying population weighting that results in an effective population density; ultimately, a realistic measure of residual risk to adjacent areas.

To avoid doubt, the method to calculate the probability density function has been published below. As identified previously, there is no requirement for applicants to calculate the probability density function as part of their safety case submission.

Procedure overview

1. Assess population data:
   Use spatial population density data (e.g. people per square kilometre from ABS grids).

[18] Annex E - Integrity and assurance levels for the Operational Safety Objectives (JAR-DEL-SRM-SORA-E-2.5)

[19] Annex F - Theoretical Basis for Ground Risk Classification and Mitigation (JAR-DEL-SRM-SORA-F-2.5)

2. Determine the RPA's maximum range[20] (R):
   Representing the maximum distance the RPA could travel from its origin.
3. Apply a normal distribution:
   The probability of an RPA impact decreases according to a normal distribution by distance from any take-off point(s):

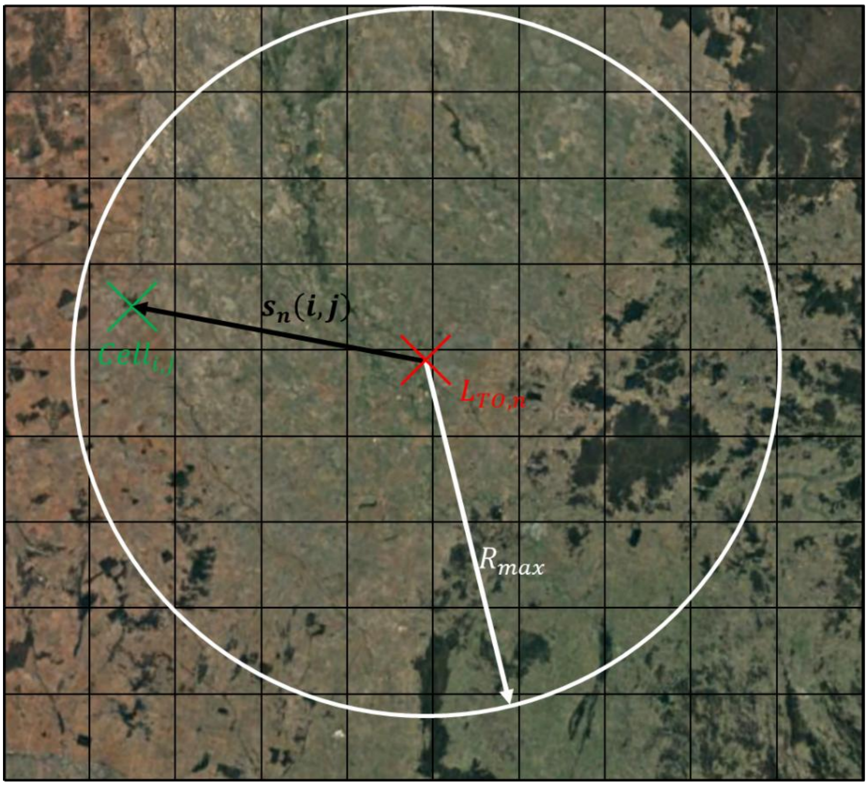

Figure 1: Containment methodology diagram

In the image above:

> $\boldsymbol{L_{TO,n}}$ is the location of the nth take-off location (latitude and longitude)
> $Cell_{i,j}$ is the cell in the ith row and jth column
> R_{max} is the maximum range of the aircraft
> $s_n(i,j)$ is the geodesic distance from $\boldsymbol{L_{TO,n}}$ to the centre of $Cell_{i,j}$

The probability of impacting $Cell_{i,j}$ is assumed to be a given by the value of a normal distribution with the mean set to the take-off location, the standard deviation set to half the maximum range, and the value of the distribution determined from the distance $s_n(i,j)$[21] [22]

[20] The maximum range of the RPA may be published by the manufacturer. Where the maximum range is not published by the manufacturer, a suitable cruise speed and endurance can be used to determine the RPA's maximum range, for example 75% of the maximum commanded speed multiplied by the typical endurance of the RPA.

[21]Instead of finding the integral across the grid square, it is assumed that the central value, applied to a population density map with equal area cells, is close enough to avoid the complex integration. For non-equal area grid squares, another approach may be required.

[22] A normal distribution was chosen as this generally represents the dropping off of probability as the distance travelled approaches the maximum range, and ensuring the 'bulk' of the distribution occurs within the first half of the distribution from the mean. Whilst some other multimodal distributions may provide more realistic estimates, it is determined that the benefit of the additional accuracy is not worth the complexity trade-off and would not adversely affect the acceptable level of safety.

$$P_{imp,n}(Cell_{i,j}) = \frac{1}{2\pi\sqrt{|\boldsymbol{\Sigma}|}} \times e^{\left(-\frac{1}{2}\begin{bmatrix} s_n(i,j) \\ 0 \end{bmatrix} \Sigma^{-1} \begin{bmatrix} s_n(i,j) & 0 \end{bmatrix}\right)}$$

$$\boldsymbol{\Sigma} = \begin{bmatrix} \frac{R_{max}}{2} & 0 \\ 0 & \frac{R_{max}}{2} \end{bmatrix}$$

$$P_{imp,n}(Cell_{i,j}) = \frac{1}{\pi R_{max}} \times e^{\left(-\frac{s_n(i,j)^2}{R_{max}}\right)}$$

4. The probability density function must be restricted to sum to 1 in the adjacent area.

Assuming that each take-off location is used uniformly, and normalising the size of the probability distribution in the adjacent area to 1, the scaled impact probability at the ith row and jth column cell can be determined:

$$P_{imp,scaled}\left(Cell_{i,j}\right) = \frac{\sum_{\forall n} P_{imp,n}\left(Cell_{i,j}\right)}{\sum_{\forall i,j \in ADJ} \sum_{\forall n} P_{imp,n}\left(Cell_{i,j}\right)}$$

Where the divisor, $\sum_{\forall i,j \in ADJ} \sum_{\forall n} P_{imp,n}\left(Cell_{i,j}\right)$, which is the sum of all the probability values from all the take-off locations across all the cells in the adjacent area, effectively scales the probability of impact such that all the cells in the adjacent area sum to 1.

5. To calculate the population density in each cell, weighted by the probability of impacting that cell, multiply each cells population density by the scaled probability of impact for that cell:

$$D_{pop,weighted}\left(Cell_{i,j}\right) = P_{imp,scaled}\left(Cell_{i,j}\right) \times D_{pop}\left(Cell_{i,j}\right)$$

6. The average population density used to represent the adjacent area is the sum of the weighted population

$$D_{pop,avg,ADJ} = \sum_{\forall i,j \in ADJ} D_{pop,weighted}\left(Cell_{i,j}\right)$$

7. The iGRC value for the adjacent area is then calculated by using $\boldsymbol{D_{pop,avg,ADJ}}$ with the critical area value (i.e. the appropriate column in Table 6).
8. Apply any appropriate ground risk mitigations to the iGRC, then use Table 12 to determine the containment robustness requirement by aligning the SAIL of the operation with the adjacent area fGRC.

Table 12: Containment robustness determination

		SAIL in the Operational Volume					
		I	II	III	IV	V	VI
Adjacent Area Final Ground Risk Class	≤3	N					
	4	L	N				
	5	L	L	N			
	6	M	M	L	N		
	7	H	H	M	L	N	
	8	Out of scope	Out of scope	Out of scope	M	L	N
	9				Out of scope	M	L
	10					Out of scope	M
	11						Out of scope

3.4 Instruction 4 – AusSORA operational safety objective robustness matrix

Table 13: AusSORA operational safety objectives and robustness matrix

OSO ID	Operational safety objective	SAIL					
		I	II	III	IV	V	VI
OSO#01	Ensure the operator is competent and/or proven	NR	L	M	H	H	H
OSO#02	UAS manufactured by competent and/or proven entity	NR	NR	L	M	H	H
OSO#03	UAS maintained by competent and/or proven entity	L	L	M	M	H	H
OSO#04	UAS components essential to safe operations are designed to an Airworthiness Design Standard (ADS)	NR	NR	NR	L	M	H
OSO#05	UAS is designed considering system safety and reliability	NR	NR	L	M	H	H
OSO#06	C3 link performance is appropriate for the operation	NR	L	L	M	H	H
OSO#07	Conformity check of the UAS to ensure consistency to the ConOps	L	L	M	M	H	H
OSO#08	Operational procedures are defined, validated and adhered to address normal, abnormal and emergency situations	L	M	H	H	H	H

OSO ID	Operational safety objective	SAIL					
		I	II	III	IV	V	VI
	potentially resulting from technical issues with the UAS or external systems supporting UAS operation, human errors or critical environmental conditions						
OSO#09	Remote crew trained and current and able to control the normal, abnormal and emergency situations potentially resulting from technical issues with the UAS or external systems supporting UAS operation, human errors or critical environmental conditions situation	L	L	M	M	H	H
OSO#13	External services supporting UAS operations are adequate to the operation	L	L	M	H	H	H
OSO#16	Multi crew coordination	L	L	M	M	H	H
OSO#17	Remote crew is fit to operate	L	L	M	M	H	H
OSO#18	Automatic protection of the flight envelope from Human Error	NR	NR	L	M	H	H
OSO#19	Safe recovery from Human Error	NR	NR	L	M	M	H
OSO#20	A Human Factors evaluation has been performed and the HMI found appropriate for the mission	NR	L	L	M	M	H
OSO#23	Environmental conditions for safe operations defined, measurable and adhered to	L	L	M	M	H	H
OSO#24	UAS designed and qualified for adverse environmental conditions	NR	NR	M	M	H	H

Changes to OSO#24 robustness

CASA has revised the robustness level assigned to OSO#24 for SAIL IV operations from high, as specified in SORA 2.5[23], to medium. This revision reflects CASA's ability to assess compliance with OSO#24 for SAIL IV operations without mandating the application of an environmental design standard or independent third-party validation.

Manufacturers and designers may elect to apply a relevant environmental design standard to support demonstration of compliance; however, this amendment provides for a more proportionate, operation-specific approach to meeting the requirement.

[23] See page 54 of JARUS guidelines on Specific Operations Risk Assessment (JAR-DEL-SRM-SORA-MB-2.5)

3.5 Instruction 5 – AusSORA reference matrix

Table 14: AusSORA reference matrix

AusSORA step	Reference document
Step 1 – Concept of operations / application	BVLOS application form and checklist
Steps 2-3 – Ground risk class assessment	AC 101-06 (Instruction 1 & 2)
*Step 3 – M2 mitigation assessment	JARUS Annex B[24]
Steps 4-6 – Air risk assessment	JARUS Annex C[25] and D[26]
Step 7 – SAIL Determination	JARUS Main Body[27] {section 4.7}
Step 8 – Containment	AC 101-06 (Instruction 3)
Step 9 – Operational Safety Objectives	AC 101-06 (Instruction 4) and JARUS Annex E[28]

3.6 Instruction 6 – Transition to AusSORA

New applications

AC 101-06 will be implemented on 11 May 2026 to give new applicants an opportunity to develop their applications to meet the requirements described the AC. Applications submitted after the implementation of AC 101-06 will need to apply the methodologies, assumptions, definitions, and acceptance criteria described in AC 101-06 when developing their submission.

Applications under assessment

CASA will continue to assess applications submitted before the implementation of AC 101-06 in accordance with the requirements at the time of application.

Changes to applications under assessment

Applicants with a SORA-based application currently under assessment or awaiting assessment, may elect to amend their application, in whole or in part, to align with the requirements of AC 101-06. Applicants intending to make such amendments are encouraged to contact CASA to discuss the proposed changes and any potential assessment implications. Where amendments are made, applicants should clearly identify the revised elements and demonstrate how the updated material satisfies the relevant requirements and policy positions.

[24] Annex B – Integrity and Assurance levels for the mitigations used to reduce the intrinsic Ground Risk Class (JAR-DEL-SRM-SORA-B-2.5)

[25] Annex C - Strategic Mitigation Collision Risk Assessment (JAR-DEL-WG6-D.04)

[26] Annex D - Tactical Mitigation Collision Risk Assessment (JAR-DEL-WG6-D.04)

[27] See page 26 of JARUS guidelines on Specific Operations Risk Assessment (JAR-DEL-SRM-SORA-MB-2.5)

[28] Annex E - Integrity and assurance levels for the Operational Safety Objectives (JAR-DEL-SRM-SORA-E-2.5)

Renewals of existing approvals

Following publication of AC 101-06, applications for renewal of approvals, will be assessed against the updated requirements of the AC. Where this may result in an increased SAIL, CASA will work with affected approval holders to provide an appropriate period to transition to the updated requirements, taking into account operational and risk considerations. This includes approvals when an RPAS was previously accepted as operating within a lower iGRC column on the basis of demonstrated kinetic energy limits, which are no longer accepted under this AC as a means of reducing the RPA critical area.[29]

[29] Version 2.0 of SORA accepted kinetic energy as a method to demonstrate reduced critical area, see page 20 of JARUS guidelines on Specific Operations Risk Assessment (JAR-DEL-WG6-D.04)