

"Introduction to Drone Technology 2021"

Module Number #7

Group Number #6

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SORA Document

Specific Operation Risk Assessment



Image source : easyreadnews.com

Operational Scenario – As we don't have relatively enough information about the coastal area. So, we consider it as "**BVLOS sparsely populated area**" with Drone of 0.8 meter in dimension which comes under the category of **GRC 4**.

1) ConOps description

For nature conservation purposes a drone is needed to provide periodical sequences of aerial images of the shoreline at the island Mandø in the Wadden Sea. The area is sparsely populated. The drone flight will be BVLOS, the pilot will be conducting the operation from a static position near the coast. All flights will be conducted under relatively low wind and no precipitation conditions. The drone is a hexarotor with a diameter of 80 cm and a total weight of 4 kg.

2) Determination of the intrinsic UAS ground risk class (GRC)

GRC 3 - BVLOS in a sparsely populated environment, diameter of the drone is < 1m

3) Final GRC determination

There are no mitigations for M1, M2 and M3. The GRC then rises to 4.

4) The Air Risk Process

ARC process overview – definition of operational air space and minimize the intrinsic risk of midair collision. In this use scenario midair collision could be with birds, hot air balloons, kites or other near beach flying objects.

Certain period of time of flight and with certain flight boundaries could be applied as strategic mitigations to reduce the risk of collision.

Determination of ARC – “ARC-B” taking the ARC assessment process decision tree, it is concluded that OPS is below 500ft and OPS is in uncontrolled over space over RURAL area (coastal area).

Proposed Solution : DAA (detect and avoid systems) as ADS-B, FLARM could be activated during the flight. Depending upon the population of flying objects available in air the tactical mitigation performance requirement (TMPR) may be a dependent factor in this use case.

5) Application of strategic mitigations to determine the residual ARC

Initial ARC assignment corresponds and adding any additional mitigations is not necessary and ARC level stays the same.

6) TMPR and robustness levels

Here, as per the use case we cannot apply ‘see and avoid’ tactical mitigation to avoid collision as we are dealing with **BVLOS**, solution to that could be DAA or multiple DAA systems.

**For operation BVLOS and the category for this use case:*

Residual ARC	TMPRs	TMPR level of Robustness
ARC-B	Low	Low

Low TMPR for ARC-B: In this case there will be a minimum probability of colliding or encountering other manned aircraft, but not negligible. Basically, the residual collision risk is so low. The lower level of TMPR is one of the best solutions for detecting other flying objects in case of remote pilot operations.

In this use case, the altitude of the drone on beach could be less than 120m, to avoid air traffic as manned aircraft are not expected to fly at this altitude.

Airspace and Operational requirements acc to SORA:

1. Permission or consent from competent authority or ANSP for safety or risk issues.
2. Airspace and air-traffic at the beach need to be understood by authority and operator and a system needs to be developed and implemented to avoid air risks.
3. There are some limitations from SORA as well, that is why the local authority and pilot needs to work together to face locally generated issues.

7) SAIL determination

Using the table for determining SAIL we use our ARC-b and GRC 3 levels and we get the final SAIL 2.

Specific Assurance and Integrity Levels (**SAIL**) ; Ground Risk Classes

SAIL determination	ARC-b
GRC 3	II

8) Identification of the operational safety objectives (OSOs)

Since there are no general OSO's that require high robustness for SAIL level 2, we will list only those that require at least medium level robustness and therefore will be paid the biggest attention.

- Technical issue with the UAS - Operational procedures are defined, validated and adhered to
- Deterioration of external systems supporting UAS operations - Procedures are in-place to handle the deterioration of external systems supporting UAS operations
- Human error - Operational procedures are defined, validated, and adhered to
- Adverse operating conditions - Operational procedures are defined, validated, and adhered to

9) Adjacent area/airspace considerations

What measures need to be taken when there is loss of control of operation which might result in infringement of the adjacent areas on ground or airspace?

Use case scenario - less populated area

In the build of drone design interference of external factors such as electromagnetic waves, hail etc. which are associated with ConOps needs to be considered.

The design and installation features could be independent, redundant, and separated.

In the safety requirements integrity and assurance level should be covered.

10) Comprehensive Safety Portfolio

SORA provides the medium with the methodology between the applicant, the competent authority and the ANSP to ensure the operation safety concerns in flying the drone cases in the terms of GRC ARC and OSO.