



ICAO

*International Civil Aviation Organization*

The Eighth Meeting of the Asia/Pacific Wildlife Hazard  
Management Working Group (AP-WHM/WG/8)

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**Agenda Item 6: Any Other Business**

**TECHNICAL SPECIFICATIONS FOR AVIAN RADAR SYSTEMS  
TO SUPPORT WILDLIFE HAZARD MANAGEMENT**

(Presented by WORLDBIRDSTRIKE ASSOCIATION)

**SUMMARY**

This paper presents the technical specifications and functional requirements for avian radar systems to support Wildlife Hazard Management (WHM) at aerodromes. It outlines key performance parameters, detection and classification capabilities, environmental requirements, and system integration features necessary for effective real-time monitoring of bird and bat activity. The paper aims to provide guidance to States and aerodrome operators.

**1. INTRODUCTION**

1.1 Wildlife hazards, particularly those arising from bird and bat strikes, remain a significant operational and safety concern in aviation, necessitating effective monitoring and mitigation measures.

1.2 ICAO Annex 14, Volume I and Airport Services Manual (Doc 9137), Part 3 – Wildlife Hazard Management highlights the need for effective surveillance and assessment of wildlife activity within and around aerodromes.

1.3 Avian radar systems combined together with other tools provide a technological solution for continuous monitoring, detection, and tracking of wildlife, enabling data-driven Wildlife Hazard Management (WHM) strategies.

1.4 To ensure consistency, effectiveness, and interoperability, there is a need to define standard technical specifications and performance requirements for avian radar systems deployed at aerodromes.

**2. DISCUSSION**

Fit-for-Purpose Study Before Radar Procurement

2.1 Airports must undertake a thorough requirement analysis and fit-for-purpose study before procuring any radar system. Radar performance is highly site-specific, influenced by terrain, environmental conditions, operational needs, and the nature of the risk (e.g., wildlife activity or ground movement).

2.2 Procurement decisions should be based on:

- Clearly defined operational requirements.
- Environmental and ecological assessment.
- Technical suitability and limitations.
- Integration with existing systems (e.g., SMS).
- Validation through trials or evidence-based assessment.

2.3 In line with International Civil Aviation Organization (ICAO) guidance, any mitigation measure must be driven by a formal risk assessment, not by technology availability alone.

2.4 Failure to do so can result in ineffective systems and unnecessary expenditure. Airports must ensure that radar solutions are fit for purpose and operationally justified.

#### Radar Performance Specifications

2.5 Avian radar systems should provide continuous surveillance of wildlife activity within the aerodrome and surrounding safeguarding areas.

#### Minimum performance requirements

2.6 Minimum performance requirements should include:

- Detection range of 6 – 10 km for small birds and up to 12 – 15 km for larger birds.
- Altitude coverage from ground level to at least 3,000 ft AGL.
- 360-degree azimuth coverage for full situational awareness.
- Elevation coverage of at least 0° to 60°.
- Capability to track multiple targets simultaneously ( $\geq 200$  tracks).
- Refresh/update rate of  $\leq 2$  seconds.
- Position accuracy within  $\pm 10 - 20$  meters.

#### Detection and Classification Capability

2.7 The system should be capable of detecting individual birds, flocking birds and bat / flying fox activity.

2.8 The system should be able to track trajectories, capture speed and direction of movement and altitude profiles of birds and bats.

#### Environmental and Operational Performance

2.9 The system shall operate under all weather conditions including high temperature variance, rain, fog and high humidity conditions.

2.10 The system should be designed to withstand wind speeds of up to 100 Km / hour, and temperatures ranging between – 300C to 500C.

2.11 For coastal and high-humidity environments, systems shall incorporate corrosion-resistant materials and marine grade protection.

#### Software and Data Analytics Requirements

2.12 The system should provide real-time monitoring through map-based display of bird movements, provide overlay of critical zones such as runways and approach paths, trigger automated alerts for high bird density and runway crossings, high risk time windows.

2.13 Data analytics capabilities should include historical data storage based on the airport requirements, provide trend analysis and heat maps.

#### Integration Requirements

2.14 The avian radar system should be capable of integration with the airport Wildlife Hazard Management Systems, Safety Management Systems (SMS), external data sources to include METAR / weather data systems and wildlife observation logs.

2.15 The integration should be capable of enablement through easy API interface management.

#### Installation and Infrastructure Requirements

2.16 Implementation shall include survey and optimisation of radar placement, radar units and their relevant mounting infrastructure and provisioning of power supply and backup systems (UPS) / battery modules.

2.17 The system shall ensure minimal interference with aviation navigation and communication systems and be compliant with applicable aviation safety standards.

#### Training and Maintenance

2.18 Training should include training of the WHM personnel and relevant stakeholders in handling of the system along with provision of the documentation covering system operation and maintenance.

2.19 Maintenance requirements shall include preventive maintenance schedules, 24/7 technical support, availability of spare parts and remote diagnostic capabilities.

#### Compliance and Demonstration

2.20 The system shall comply with ICAO-aligned WHM requirements.

2.21 The supplier shall demonstrate device performance across operational areas and provide testimonials of deployment at other international aerodromes.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.