INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC REGIONAL GUIDANCE MATERIAL FOR GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) RADIO FREQUENCY INTERFERENCE (RFI) AND ASSOCIATED DATA LINK DISRUPTION COORDINATION AND REPORTING PROCEDURES

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This guidance was developed by the Procedures for GNSS and Data Link Disruption Ad Hoc Group

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CONTENTS

1. SCOPE OF THE DOCUMENT

Guidance for GNSS RFI and its Associated Data Link Disruption Coordination and Reporting Procedures

1.1 This document, *Asia/Pacific Regional Guidance Material for GNSS RFI and Associated Data Link Disruption Coordination and Reporting Procedures*, provides non-binding guidance material for Asia and Pacific (APAC) States/Administrations on Radio Frequency Interference (RFI) affecting Global Navigation Satellite System (GNSS) and its associated Air Traffic Services (ATS) data link operations.

1.2 This document is intended to support a harmonized regional approach through the establishment of common reporting processes, coordination mechanisms, and operational considerations intended to mitigate the safety and operational impacts of GNSS RFI and its associated data link disruption.

1.3 This document does not supersede ICAO Standards and Recommended Practices (SARPs) and should be applied in conjunction with relevant provisions contained in ICAO Annexes, Procedures for Air Navigation Services (PANS) and associated guidance material.

Document Review

1.4 This document will be subject to ad hoc review as needed, in response to relevant global or regional developments.

1.5 Reviews should include examination of relevant new or amended ICAO Annexes, PANS and guidance material to ensure the minimization of duplication, and alignment with global direction.

2. INTRODUCTION

Background

2.1 The Twelfth Meeting of the Air Traffic Management Sub-Group (ATM/SG/12, Bangkok, Thailand, 23 – 27 September 2024), which reports to the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), adopted *Decision ATM/SG/12-8: Establish Procedures for GNSS and Data Link Disruption Ad Hoc Group*.

2.2 The Ad Hoc Group was tasked to:

a) collect data on GNSS and data link disruption in APAC region; and

b) develop the procedures for GNSS and data link disruption that include (but not limited to) the need for:

i. reporting process by airspace users to ATS units; and

ii. sharing of information between stakeholders.

2.3 The work of the Ad Hoc Group resulted in the development of operational reporting procedures and coordination mechanisms intended to enhance regional situational awareness and resilience.

Background on GNSS in Aviation

2.4 The United States' Global Positioning System (GPS), the first operational GNSS, became fully operational in 1995. Since then, additional satellite constellations have become operational, including:

a) Global'naya Navigatsionnaya Sputnikovaya Sistema (GLONASS);

b) Galileo; and

c) BeiDou Navigation Satellite System.

2.5 Collectively, these systems form the foundation of modern GNSS capability.

2.6 GNSS has enabled significant safety and efficiency improvements in civil aviation. Applications include:

a) Performance-based Navigation (PBN) operations across all phases of flight;

b) area navigation;

c) Automatic Dependent Surveillance – Broadcast (ADS-B);

d) Automatic Dependent Surveillance – Contract (ADS-C);

e) Multilateration (MLAT) when integrated with GNSS-derived timing;

f) moving map displays and synthetic vision systems;

g) Search and Rescue (SAR) emergency locator transmitters (ELTs); and

h) precision timing application supporting Communications, Navigation and Surveillance (CNS) systems.

2.7 The increasing integration of GNSS into airborne and ground-based systems has resulted in substantial operational dependence on satellite-based Positioning, Navigation and Timing (PNT).

2.8 The need for resilient terrestrial backup capabilities was recognized under the Global Air Navigation Plan's (GANP) Aviation System Block Upgrade (ASBU) framework through the Minimum Operational Network (MON) concept. While MON provides a terrestrial navigation safety net, it represents only one component of a comprehensive resilience strategy required to address widespread GNSS disruption.

GNSS RFI

2.9 GNSS signals are inherently low power at the receiver antenna and therefore vulnerable to both intentional and unintentional sources of RFI. In addition, certain ionospheric disturbances from space weather events may degrade signal quality.

2.10 RFI affecting GNSS may result in:

a) loss of position accuracy:

b) loss of navigation capability;

c) loss of timing synchronisation; or

d) hazardously misleading information.

2.11 In recent years, the aviation community has observed a rising number of GNSS RFI occurrences in the form of jamming and spoofing, reported on a recurring basis in several regions of the world especially in proximity to certain conflict areas, with associated operational impacts reported by operators and service providers.

2.12 The United Nations Terminology Database (UNTERM; https://unterm.un.org) defines:

a) **jamming**, as intentional RFI that prevents GNSS receiver from locking onto satellite signals, effectively rendering the GNSS system unusable or degraded for users in the jammed area; and

b) **spoofing**, as the broadcast of GNSS-like signals that cause avionics to calculate erroneous positions and provide false guidance.

2.13 GNSS RFI affecting civil aviation arises under a range of circumstances:

a) **unintentional interference**, often associated with equipment malfunction or unintended emissions from aviation or non-aviation systems. Such occurrences have historically been limited and typically resolved once identified;

b) **intentional interference not directed at aviation**, where any impact on aviation is generally incidental rather than deliberate and civil aircraft becomes a collateral consequence; and

c) **intentional interference directed at aviation**, where the severity can range from relatively benign cases such as the misuse of low-power devices in or near aircraft or aerodromes to more serious scenarios involving targeted jamming of approach or terminal airspace.

2.14 Such interference is typically localized and intermittent. However, when combined with multipath effects or ionospheric disturbances, it may degrade GNSS receiver performance.

2.15 Multipath occurs when a radio signal reaches the receiver via both direct and reflected paths, creating time-delayed and phase-shifted signal components. Although GNSS receivers are designed to mitigate predictable multipath and ionospheric effects, unpredictable RFI may compound these errors and reduce positioning integrity.

2.16 There are no specific flight crew alerts for GNSS RFI. When GNSS RFI occurs, flight crew may see multiple system warnings but cannot easily tell which ones are caused by the interference. For example, some aircraft Flight Management Systems (FMS) rely on GNSS for time measurement and even Inertial Navigation Systems (INS) may use GNSS inputs. Thus, GNSS RFI can affect multiple systems simultaneously, making it difficult for flight crew to identify the source of the problem.

Operational Considerations

2.17 As GNSS RFI may occur during any phase of flight, contingency procedures should consider:

a) phase-of-flight criticality;

b) available response time;

c) airspace complexity; and

d) availability of conventional navigation infrastructure.

2.18 Mitigation measures should prioritize:

a) prevention of interference sources where practicable;

b) system resilience through redundancy and alternative navigation capability; and

c) reactive operational measures to ensure continued safety of flight.

Policy and Strategic Considerations

2.19 The ICAO Fourteenth Air Navigation Conference (AN-Conf/14, Montreal, Canada, 26 August – 06 September 2024) *Recommendation 2.2/2*, urged States/Administrations to address GNSS RFI and contingency planning by maintaining sufficient conventional navigation infrastructure to ensure operational safety and airspace capacity during periods of satellite navigation disruption.

2.20 The ICAO APAC Radio Navigation Symposium (New Delhi, India, 7 – 9 April 2025) identified several recommendations relevant to RFI management. Key focus areas include:

a) improve coordination with the military;

b) monitor and geolocate the source of the GNSS RFI [consider using ADS-B Out (ground-based or space-based) or Wide Area Multilateration (WAM)];

c) prohibit the sale of GNSS jamming transmitters;

d) use standard radiotelephony phraseologies for specific RFI scenarios;

e) integrate GNSS RFI factors into contingency fuel and alternate planning;

f) maintain a Resilient Navigation Operational Network (RON) in the event of RFI;

g) consider space-based surveillance and evolution into Satellite Time Difference of Arrival (TDA) to mitigate GNSS RFI;

h) ensure flight crew maintain proficiency in conventional navigation methods;

i) ensure a full Inertial Reference System (IRS) alignment before departure;

j) provide comprehensive training and awareness programmes for controller and Air Traffic Safety Electronic Personnel (ATSEP);

k) consider GNSS RFI information exchange using NOTAM, Aeronautical Information Publication (AIP), and/or Automatic Terminal Information Service (ATIS), Electronic Flight Bags (EFB) and the International Air Transport Association's (IATA) Turbulence Aware platform;

l) enhance GNSS robustness with rapidly deployable Multi-Mode Receivers (MMR) and strategic system upgrades; and

m) achieve robust PNT with a comprehensive assessment of:

   i. cyber risk for all CNS and ATM systems; and

   ii. GNSS vulnerabilities, their impact on air, ground and space systems, and the maintenance of operational independence.

3. REFERENCES

3.1 ICAO Annexes and Documents:

a) ICAO Annex 6 – *Operation of Aircraft*;

b) ICAO Annex 10 – *Aeronautical Telecommunication*;

c) ICAO Annex 19 – *Safety Management*;

d) ICAO Doc 4444 – *Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM)*;

e) ICAO Doc 9849 – *Global Navigation Satellite System (GNSS) Manual*;

f) ICAO Doc 10037 – *Global Operational Data Link Manual*;

g) ICAO Doc 10066 – *Procedures for Air Navigation Services – Aeronautical Information Management (PANS-AIM)*; and

h) ICAO Doc 10088 – *Manual on Civil-Military Cooperation in Air Traffic Management*.

3.2 ICAO Assembly Resolutions:

a) *Assembly Resolution A41-8, Appendix C: Ensuring the resilience of ICAO CNS/ATM systems and* services; and

b) *Assembly Resolution A42-4: Addressing risks to civil aviation arising from conflict zones*.

3.3 APANPIRG Conclusions/Decisions:

a) *APANPIRG Conclusion 27/36: Protection of GNSS Signal Against Jamming*.

3.4 Others:

a) ICAO State Letter AN 7/5-20/89 – *Strengthening of communications, navigation, and surveillance (CNS) systems resilience and mitigation of interference to global navigation satellite system (GNSS)*; and

b) ICAO Electronic Bulletin 2011/56 – *Interference to Global Navigation Satellite System (GNSS) Signals*.

3.5 Abbreviations:

ACI	Airports Council International
ADS-B	Automatic Dependent Surveillance – Broadcast
ADS-C	Automatic Dependent Surveillance – Contract
AIM	Aeronautical Information Management
AIP	Aeronautical Information Publication
AIS	Aeronautical Information Service
ANSP	Air Navigation Services Provider
APAC	Asia/Pacific
APNT	Alternative Position, Navigation and Timing
ASBU	Aviation Safety Block Upgrade
ATIS	Automatic Terminal Information Service

ATS	Air Traffic Services
ATSEP	Air Traffic Safety Electronic Personnel
CAA	Civil Aviation Authority
CFIT	Controlled Flight into Terrain
CNS	Communications, Navigation and Surveillance
CPDLC	Controller-Pilot Data Link Communications
DFMC	Dual-Frequency/Multi-Constellation
DME	Distance Measuring Equipment
ECAM	Electronic Centralized Aircraft Monitor
EFB	Electronic Flight Bag
EICAS	Engine Indicating and Crew Alerting System
ELT	Emergency Locator Transmitter
FCOM	Flight Crew Operating Manual
FIR	Flight Information Region
FMS	Flight Management System
GANP	Global Air Navigation Plan
GBAS	Ground Based Augmentation System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPWS	Ground Proximity Warning System
HF	High Frequency
IATA	International Air Transport Association
IFALPA	International Federation of Airline Pilots' Associations
IFATCA	International Federation of Air Traffic Control Associations
ILS	Instrument Landing System
INS	Inertial Navigation System
IRS	Inertial Reference System
ITU	International Telecommunication Union
MEL	Minimum Equipment List
MFMC	Multi-Frequency Multi-Constellation
MLAT	Multilateration
MMR	Multi-Mode Receivers
MON	Minimum Operational Network
MOPS	Minimum Operational Performance Standards
OEM	Original Equipment Manufacturer
PANS	Procedures for Air Navigation Services
PBN	Performance-based Navigation

PNT	Positioning, Navigation and Timing
POC	Point of Contact
RAIM	Receiver Autonomous Integrity Monitoring
RFI	Radio Frequency Interference
RON	Resilient Navigation Operational Network
SAR	Search and Rescue
SARPs	Standards and Recommended Practices
SATCOM	Satellite Communication
SBAS	Satellite-Based Augmentation System
SIRRS	Satellite Interference Reporting and Resolution System
SMS	Safety Management System
TAWS	Terrain Awareness Warning System
TCAS	Traffic Alert and Collision Avoidance System
TDA	Time Difference of Arrival
UAS	Unmanned Aerial System
UTC	Coordinated Universal Time
VOR	VHF Omnidirectional Radio Range
WAM	Wide Area Multilateration

4. OVERVIEW

4.1 This document establishes a harmonized framework for the detection, reporting and management of GNSS RFI and its associated data link disruptions in the APAC region. It integrates operational, technical and regulatory perspectives to support timely mitigation of safety and operational impacts while maintaining consistency across States/Administrations and Air Navigation Service Providers (ANSPs).

4.2 This document promotes a structured and consistent approach to:

a) timely reporting of suspected GNSS RFI and its associated data link disruption events;

b) coordinated operational response to mitigate safety impacts;

c) systematic information sharing among civil aviation stakeholders; and

d) enhancement of regional situational awareness and resilience.

4.3 The framework operates across three layers:

a) operational layer, covering real-time flight crew reporting, controller response, and tactical mitigation;

b) national layer, encompassing technical validation, post-flight reporting, and coordination among ANSPs, Civil Aviation Authorities (CAAs), and aircraft operators; and

c) regional layer, which addresses cross-Flight Information Region (FIR) coordination, harmonized reporting, and engagement with the ICAO APAC Regional Office for interference events with impact to multiple States/Administrations.

4.4 Both tactical and pre-tactical reporting, along with standardized phraseology and structured workflows, ensure consistent situational awareness and risk mitigation.

4.5 By providing an integrated approach to detection, operational response, investigation, regional coordination, and trend monitoring, this framework strengthens resilience to GNSS and data link disruptions. It promotes transparency, enables rapid mitigation measures, and supports long-term planning to preserve the safety, continuity, and efficiency of civil aviation operations across the APAC region.

5. ROLES AND RESPONSIBILITIES

Overview

5.1 Effective management of GNSS RFI requires coordinated action at international, regional, national and operational levels. The following roles and responsibilities support a harmonized APAC region framework.

International Civil Aviation Organization (ICAO)

5.2 ICAO plays a central role in the global coordination of GNSS RFI resilience and mitigation.

5.3 ICAO should:

a) develop and promulgate international SARPs, PANS and guidance material addressing GNSS RFI, including updates to relevant documents such as ICAO Annex 10 and ICAO Doc 9849, to support States/Administrations in mitigating its safety and operational impacts;

b) coordinate expert groups dedicated to the development of standards and long-term resilience measures, including work on Alternative Position, Navigation and Timing (APNT), spectrum protection, and system robustness;

c) promote global awareness of GNSS RFI risks and highlight that such interference is expected to persist, thereby encouraging States/Administrations to strengthen monitoring and resilience measures;

d) facilitate coordination where GNSS RFI events have cross-FIR implications and cannot be resolved by individual States/Administrations, including engagement under International Telecommunication Union (ITU) radio regulations procedures; and

e) review the standardized radiotelephony phraseologies in ICAO Doc 4444 to ensure relevancy for GNSS RFI scenarios, and propose new phraseologies for inclusion where gaps, which may require additional phraseologies to be added, are identified.

States/Administrations and CAAs

5.4 States/Administrations retain overall responsibility for ensuring the safety of civil aviation within their airspace.

5.5 States/Administrations, through their CAAs, should:

a) establish regulatory frameworks to address GNSS RFI mitigation and resilience;

b) monitor, assess, and report GNSS RFI events within their airspace, and collaborate with ANSPs and international counterparts to mitigate operational impacts;

c) issue operational advisories and contingency instructions to airspace users when GNSS RFI affects navigation performance or system integrity;

d) report to and coordinate with national spectrum and telecommunications regulators to investigate interference sources and provide relevant information to ICAO for regional and global situational awareness;

e) coordinate with military authorities regarding activities potentially hazardous to civil aviation, including the use of GNSS jammers during exercise or operations; and

f) include appropriate reporting provisions in the AIP, including procedures related to GNSS loss of capability.

5.6 Based on the State's/Administration's arrangement, these responsibilities may also be handled by the ANSP.

ANSPs

5.7 ANSPs are responsible for maintaining safe and orderly air traffic services during GNSS RFI and its associated data link disruptions.

5.8 ANSPs should:

a) strengthen navigation aid resilience, particularly when implementing rationalization under the MON concept;

b) conduct risk assessments addressing potential impacts of GNSS RFI on navigation, surveillance and timing systems, including ADS-B and other GNSS-dependent services;

c) establish procedures to identify, assess and minimize GNSS RFI sources in coordination with regulators and law enforcement authorities;

d) coordinate with adjacent FIRs to ensure consistent handling of interference events across boundaries;

e) disseminate GNSS RFI events and information via appropriate notification channels as described in Chapter 10 of this document;

f) develop contingency procedures to mitigate the effects of GNSS RFI, including fallback surveillance and communication measures; and

g) implement GNSS RFI awareness training for operational and technical personnel.

ATS Units

5.9 ATS units should:

a) monitor flight crew reports and correlate them with other situational data to validate potential GNSS RFI and its associated data link disruptions;

b) provide immediate operational instructions to affected aircraft, including radar vectors, position verification, altitude confirmation, and fallback communications procedures;

c) coordinate with adjacent ATS units to ensure continuity of service and consistent handling of anomalies across FIR boundaries;

d) submit notifications or reports through existing national and ICAO-compliant mechanisms, ensuring no duplication of reporting pathways; and

e) support information flow to relevant ANSP CNS units for technical investigation and analysis.

CNS Units

5.10 CNS units should:

a) coordinate with ATS units and/or relevant monitoring units, where applicable to assess operational impacts, investigate potential root causes, and ensure accurate documentation of the event;

b) report significant disruptions to the national level ATM POC in a timely and standardized manner; and

c) if applicable, report GNSS RFI events to national spectrum and telecommunications regulators to investigate interference sources.

AIS/Aeronautical Information Management (AIM) Unit

5.11 AIS/AIM units should:

a) publish aeronautical information appropriately and in a timely manner upon receiving a request from originator, concerning GNSS RFI and associated data link failure;

b) ensure that publications are timely, accurate and operationally relevant; and

c) coordinate with ATS, CNS and regulatory authorities prior to publication, as required by national procedures.

Aircraft Operators

5.12 Aircraft operators are responsible for assessing operational risks associated with GNSS RFI and ensuring appropriate mitigation measures are implemented.

5.13 Aircraft operators should:

a) establish mechanisms to receive current GNSS RFI information, including regulatory advisories, ICAO guidance, industry briefings and NOTAMs;

b) conduct safety assessments addressing risks associated with degradation or loss of GNSS-dependent systems;

c) coordinate with Original Equipment Manufacturers (OEMs) to understand aircraft-specific impacts of GNSS RFI events;

d) develop and maintain contingency procedures addressing GNSS RFI and associated data link disruptions;

e) ensure flight planning considers availability of conventional navigation aids and suitable alternate procedures;

f) brief flight crews and operational control personnel on ongoing GNSS RFI events and associated operational considerations;

g) conduct GNSS RFI awareness training for flight operations, dispatch and maintenance personnel; and

h) analyze reported GNSS RFI events to support internal safety management and State/Administration-level reporting.

Flight Crew

5.14 Flight crew should:

a) timely recognise and verify potential GNSS degradation, navigation anomalies, or ADS-C/Controller-Pilot Data Link Communications (CPDLC) performance issues;

b) report anomalies to ATS units using established procedures, including voice communication where data link performance is degraded;

c) execute operational contingency procedures, such as reverting to conventional navigation or surveillance methods as required; and

d) document post-flight reports in accordance with operator procedures to support trend analysis and State/Administration-level safety assessments.

Aerodrome Operators

5.15 Aerodrome operators should:

a) submit requests to the AIS/AIM unit for the publication of aeronautical information related to aerodrome facilities affected by GNSS RFI;

b) maintain reliable communication and coordination with ATS units, CNS units, aircraft operators, and relevant authorities;

c) as applicable, implement or otherwise support aerodrome radio frequency management measures to mitigate the risk of local radio frequency interference, including the identification, control, or elimination of potential radio frequency emitters located within aerodrome boundaries;

d) in the event of persistent interference, facilitate or otherwise support (as applicable) radio frequency spectrum surveys, site inspections, or technical investigations in coordination with the CAA and/or the ANSP, in accordance with applicable national regulatory requirements;

e) participate in post-event reviews by providing relevant ground-based system logs, maintenance data, and local observations to support safety investigation, analysis, and root-cause identification; and

f) monitor trends in GNSS RFI-related occurrences, incorporating relevant findings into airport safety committee deliberations, Safety Management System (SMS) reporting processes, and corrective action tracking mechanisms to support continuous safety improvement in close coordination with the CAA.

6. DETECTION OF GNSS RFI EVENTS

Overview

6.1 Detection of GNSS RFI events relies on a combination of technical monitoring systems, operational observations, and aircraft reports. Timely detection is critical given the density of international operations and the extensive reliance on GNSS for navigation, surveillance, and data link enabled ATM services.

6.2 GNSS RFI events may be detected through the following sources:

a) ground-based GNSS monitoring networks and reference stations;

b) ATM system alerts indicating degradation of dependent services (e.g. ADS-B, ADS-C, CPDLC). Depending on the ATM system in use, controllers may be alerted by, but not limited to, the following:

i. degradations in RNP due to overdue position reports or low figure of merit values;

ii. discarded downlinks with time stamps indicating that they were sent after they were received;

iii. aircraft inability to remain connected to CPDLC; and

iv. ADS-B position gaps, inconsistencies or jumps.

c) flight crew reports of navigation or data link abnormalities. Reports may include, but are not limited to:

i. GNSS failure message;

ii. ADS-B failure/warning;

iii. Ground Proximity Warning System (GPWS) caution or failure message;

iv. loss of Satellite Communication (SATCOM);

v. loss of synthetic vision system;

vi. rapid actual navigation performance value increase;

vii. GNSS position and IRS or FMS “Position Disagree” caution message; and

viii. unexpected change in aircraft clock time.

d) ANSP operational observations, including loss of surveillance fidelity or unexpected system behaviour.

6.3 Early detection enables rapid coordination, mitigation, and accurate reporting to regional and global stakeholders.

Recognition of GNSS RFI

6.4 GNSS RFI should be recognized when abnormal GNSS performance is observed that is inconsistent with known system outages or expected propagation effects. GNSS RFI may be intentional or unintentional and may manifest as jamming or spoofing.

6.5 Common indicators of GNSS RFI include:

a) sudden or intermittent loss of GNSS position, velocity, or time information;

b) degradation of navigation accuracy, integrity, or availability without prior notice;

c) simultaneous GNSS performance issues reported by multiple aircraft or ground systems within a defined geographic area;

d) GNSS receiver alerts indicating signal interference, loss of lock, or integrity warnings; and

e) correlated degradation across multiple GNSS-dependent services (e.g. PBN operations, ADS-B).

Note: recognition should be based on pattern analysis rather than single-source observations.

Recognition of Data Link Disruption due to GNSS RFI

6.6 Data link disruptions attributable to GNSS RFI should be recognized when CPDLC, ADS-C, or related services are disrupted in a manner that correlates temporally and geographically with GNSS performance issues.

6.7 Common indicators include:

a) loss or degradation of ADS-C position reporting coincident with GNSS anomalies, such as:

i. position reports overdue

ii. degraded figure of merit values;

b) CPDLC message failures, delays, or abnormal session terminations linked to GNSS-derived position or time dependencies;

c) inconsistencies between primary and backup communication or surveillance systems; and

d) concurrent reports from aircraft indicating both navigation performance degradation and data link disruption.

6.8 It is essential to distinguish GNSS associated data link disruptions from network or service provider outages, aircraft avionics failures, or procedural and human factors issues.

Classification of GNSS RFI Events

6.9 Once detected and recognized, GNSS RFI and its associated data link anomalies should be classified to support appropriate coordination, reporting, and mitigation actions. Initial classification should be operationally focused and may be refined as additional information becomes available.

6.10 Recommended classification dimensions include:

a) type of GNSS RFI events:

i. GNSS interference (jamming);

ii. GNSS signal manipulation (suspected spoofing);

iii. GNSS signal degradation or loss (cause undetermined);

iv. GNSS associated data link disruption; and

v. combined GNSS and data link impact.

b) scope and impact:

i. single aircraft;

ii. multiple aircraft;

iii. sector-wide;

iv. airport-wide;

v. FIR-wide or cross-FIR; and

vi. regional or cross-regional.

c) severity (operational impact):

i. Minor: no impact to safety or service continuity;

ii. Moderate: degraded operations requiring procedural mitigation;

iii. Significant: loss of services requiring contingency procedures; and

iv. Severe: safety-critical impact or widespread disruption.

d) confidence level:

i. confirmed;

ii. suspected; or

iii. under investigation.

6.11 Initial classification should prioritize operational decision-making and information sharing rather than definitive technical attribution.

7. STANDARDIZED OPERATIONAL REPORTING MECHANISMS

Overview

7.1 Effective management of GNSS RFI and its associated data link disruptions requires timely operational reporting, structured controller response, and coordinated information dissemination. Procedures related to GNSS RFI should be published in the AIP as follows:

a) where procedures describe actions to be taken by flight crew during GNSS or data link disruption that directly affect the conduct of flight, the most appropriate location is section ENR 1.1; and

b) where additional detail is required regarding formal reporting mechanisms, post-event notification process, or coordination channel with ATS unit or relevant authorities, a reference may be included in section ENR 1.14.

Reporting Procedures by Flight Crew to Controller

7.2 Flight crew encountering GNSS RFI and its associated data link disruptions should, as soon as practicable, report the occurrence to the appropriate ATS unit using the applicable air-ground communication frequency. This reporting is vital if it is a previously unidentified area of RFI, to facilitate the rapid dissemination of safety-critical information to other aircraft operating within the affected area.

7.3 Flight crew should, as soon as practicable, report to the appropriate ATS unit upon the occurrence of any operational anomaly or system degradation consistent with the indicators described in Chapter 6 of this document. Reporting should be conducted in accordance with the provisions in ICAO Doc 4444 Chapter 12 and ICAO Annex 10 Volumes I and II.

GNSS RFI

7.4 Flight crews should report any suspected or confirmed GNSS degradation, denial, or interference, including but not limited to:

a) total or partial loss of GNSS signals reception impacting navigation accuracy;

b) anomalies impacting navigation precision or surveillance integrity (e.g. ADS-B positional integrity); or

c) disruption of time synchronisation services critical to flight operations.

GNSS RFI Associated Impacts

7.5 For GNSS RFI associated data link disruption, flight crew should notify controller of the occurrence in accordance with the ICAO Doc 10037.

7.6 For GNSS RFI associated navigation performance degradation, flight crew shall notify controller of any loss of RNP or inability to comply with the navigation specification in accordance with ICAO Doc 9613.

Safety-Significant Operational Impact

7.7 Flight crew should report any GNSS RFI event where system degradation directly necessitates a change in flight profile or tactical execution, specifically, but not limited to:

a) any event resulting in the inability to execute published instrument flight procedures;

b) execution of a missed approach or go-around due to navigation guidance loss; or

c) requiring reversion from PBN to conventional navigation methods [e.g. VHF Omnidirectional Radio Range (VOR), Distance Measuring Equipment (DME) and Instrument Landing System (ILS)].

7.8 Radiotelephony phraseology examples are as follows:

Event	**Phraseology**
GNSS RFI experienced	BASIC GNSS UNAVAILABLE [DUE TO (*reason, e.g.* LOSS OF RAIM *or* RAIM ALERT)] e.g. BASIC GNSS UNAVAILABLE DUE TO GNSS JAMMING BASIC GNSS UNAVAILABLE DUE TO GNSS SPOOFING BASIC GNSS UNAVAILABLE DUE TO INTERFERENCE

Note: As there is currently no standard phraseology for flight crew to advise controller that GNSS RFI is no longer present, flight crew may convey this using one of the following:

a) GNSS JAMMING NO LONGER EXPERIENCED; or

b) GNSS SPOOFING NO LONGER EXPERIENCED; or

c) GNSS INTERFERENCE NO LONGER EXPERIENCED.

7.9 Flight crew should, as soon as practicable, relay the following minimum information to controller at the time the anomaly is observed:

a) aircraft callsign;

b) time of occurrence in Coordinated Universal Time (UTC); and

c) approximate position (latitude/longitude, fix, radial/distance, or segment of ATS route).

7.10 Flight crew is required to communicate the following supplemental information to controller when it is practicable to do so:

a) nature of anomaly (GNSS, CPDLC, ADS-C, ADS-B);

b) operational impact (unable RNAV/RNP, rerouting needed, reverting to voice, surveillance affected);

c) any assistance required; and/or

d) any attempted mitigation (switch to DME/VOR, inertial navigation, reversionary procedures).

Sequence of Actions to be Taken by ATS Unit

7.11 Upon receipt of a GNSS RFI report from flight crew, the ATS unit should first acknowledge the report and initiate tactical operational mitigation.

7.12 The ATS unit should concurrently forward the report to the appropriate ANSP CNS unit for investigation and analysis of the situation. This phase ensures that immediate safety measures are applied while investigation and analysis are being conducted.

7.13 Following the initial assessment and controller acknowledgement, the ATS unit should monitor the affected airspace for further reports. If no further instances are reported, the process moves directly to recording the information. In the event of repeated occurrences, the ATS unit should notify all related stakeholders, including adjacent ATS units/ANSPs and aircraft operators. This notification is a precursor to the formal issuance of a NOTAM to alert all affected airspace users.

7.14 If the GNSS RFI is determined to be persistent, the ATS unit should coordinate the issuance of a NOTAM to officially promulgate the hazard information to all airspace users. Once a NOTAM has been issued, the ATS unit should continue to monitor for further recurrence to assess whether there is a need to extend the NOTAM validity should the occurrence prolong or cancel the NOTAM and resume normal operation should there be no recurrence reported.

7.15 The ATS unit should record all pertinent information received and file a formal report in accordance with applicable national regulatory requirements, to document the event and its resolution.

7.16 A comprehensive workflow chart for the ATS unit action in handling GNSS RFI real-time reporting can be found in **Appendix 1**.

Post-Flight Reporting

7.17 Aircraft operators should submit a Post-Flight Reporting Form (see sample template in **Appendix 2**) following any GNSS RFI event, as follows:

Item / Elements	**Details**
Submission Timeline	Within 48 hours of the event, or as soon as practicable in the case of a safety-significant occurrence.
Reporting Channels	CAA occurrence reporting system, or any applicable reporting medium, is available for use.
Purpose	To support occurrence investigation, trend analysis, and coordination of operational, technical, and regulatory mitigation measures.

7.18 The following data elements should be collected consistently by the State/Administration to enable effective investigation, analysis, and trend monitoring:

Elements	**Details**
Aircraft Identification	Callsign, aircraft registration, aircraft type and operator.
Flight Details	Flight number, origin and destination aerodromes, ATS route or segment, cleared level and speed
Time and Position	time (in UTC) of onset and cessation; aircraft position (latitude/longitude or fix), altitude/flight level, and phase of flight.
Symptoms / Operational Impacts	Examples: loss or degradation of navigation guidance; RAIM alerts; “GPS PRIMARY LOST” indications; inability to conduct RNAV/RNP operations; CPDLC uplink/downlink failures; ADS-C contract drops; ADS-B degradation; timing or synchronization anomalies.
Duration / Intermittency	Event characterization (single, intermittent, or continuous), including start and end times.

Elements	Details
Mitigations Applied	Reversion to conventional navigation aids; radar vectoring; speed and/or altitude changes; procedural or route amendments.
Operational Consequences	Route deviations, delays, go-around events, activation of contingency procedures, or any loss of separation risk (if applicable).
Unit and Contacts	ATS unit, controller identifier (where permitted), and FIR contact point.
Weather / Environmental Context	Relevant meteorological or environmental conditions, including known solar activity, thunderstorms, military activity, or observed RF sources.
Equipment Details (if available)	FMS make and model; GNSS receiver type; software/Software Control Number version; data link media (SATCOM, VHF, HF) and service provider; antenna configuration where relevant.
Attachments / Logs (if available)	Supporting evidence such as FMS screenshots, maintenance log references, ACARS or CPDLC log extracts, and recorded alerts or messages.

7.19 States/Administrations shall apply applicable national and operator data-protection policies in accordance with ICAO Annex 19, ensuring a non-punitive safety reporting environment and the appropriate protection of personal identifiers.

7.20 GNSS RFI event reports should be processed in accordance with the reporting workflow outlined in **Appendix 3**.

Aerodrome Operator Engagement

7.21 To enhance aerodrome-level situational awareness, timely dissemination of operational advisories to airspace users through the responsible organization is needed to support effective management of the local radio frequency environment, particularly where GNSS RFI may impact aerodrome safety or efficiency.

7.22 Aircraft operators should submit a report of any GNSS RFI incidents occurring within the vicinity of an aerodrome ~~to the relevant aerodrome operator~~ via an established reporting ~~platform or any applicable reporting~~ procedures.

7.23 The aerodrome operator should establish procedures to promulgate airside advisories ~~internally~~, ensuring operational awareness among key aerodrome stakeholders through the responsible organization.

Original Equipment Manufacturer (OEM) Engagement

7.24 Close coordination and strategic engagement with aircraft and equipment OEMs are crucial to enable targeted technical diagnostics and effective corrective actions. This coordination ensures alignment with applicable manufacturer notifications, such as Service Bulletins and Service Letters regarding effects of GNSS RFI events.

7.25 Engagement with OEMs should be initiated upon the identification of any of the following conditions:

a) recurrent anomalies affecting specific aircraft fleets, avionics types, or equipment configurations;

b) suspected defects in avionics software, firmware, or system configuration impacting GNSS, data link, or surveillance performance; or

c) complex or safety significant events requiring specialist engineering analysis or manufacturer-level support.

8. INVESTIGATION AND ANALYSIS PROCEDURES

Overview

8.1 Once immediate safety is assured and initial reports are received, the investigation and analysis will need to be carried out to establish the source and scope, assess the safety impact, and apply applicable mitigations. The following provisions describe some of the investigation and analysis procedures.

ANSP CNS Unit Actions

8.2 There are different levels of investigation and analysis that may be carried out by ANSP CNS units. These range from use of existing information already available to the ANSP to do basic investigation and analysis to advanced detection capabilities. States/Administrations can determine the appropriate level of investigation and analysis capabilities of the ANSP CNS unit to ensure safe operations.

8.3 Basic investigation and analysis of GNSS RFI events may be conducted through monitoring of systems dependent on GNSS (e.g. ADS-B). ADS-B messages contain multiple data fields [e.g. Navigation Uncertainty Category – Position (NUCp), Navigation Integrity Category (NIC), Navigation Accuracy Category for Position (NACp), Source Integrity Level (SIL), Figure of Merit (FOM)], which indicates the integrity and accuracy of the position message. When the ADS-B messages from multiple aircraft demonstrate low values for these data fields, it will indicate a possible GNSS RFI event and the area affected can be derived from when the ADS-B messages first show signs of degradation. A rough location of the source of interference may then be determined.

8.4 ANSP CNS units may also, if applicable, coordinate with the national spectrum and telecommunications regulators to explore deploying direction finders to detect and locate GNSS RFI sources. These employ various techniques like using time difference of arrival from multiple signals to then triangulate the location of the source with greater precision.

Operational Risk Assessment

8.5 Based on the investigation and analysis results of the GNSS RFI event, ANSPs should conduct an operational risk assessment to determine the effects and necessary mitigations based on the likelihood and severity of the identified scenario.

8.6 Once the appropriate required mitigations have been identified, ANSPs should begin coordination and notification processes to raise awareness of all stakeholders on the ongoing event as well as monitoring for trends and incorporating lessons learnt into training syllabus which will be covered in the later chapters.

8.7 IATA has published *Global Navigation Satellite System (GNSS) Radio Frequency Interference Safety Risk Assessment* for use by airlines and included in-part in Chapter 11 of this document.

9. REGIONAL COORDINATION FRAMEWORK

Overview

9.1 Addressing GNSS RFI that transcends national borders requires a multi-lateral approach involving diplomacy, data synchronization, and cross-border regulatory enforcement. Given the proliferation of interference, States/Administrations must recognize that GNSS RFI may impact neighbouring regions across national borders. In such instances, the regional coordination framework detailed in this Chapter can be used as a guidance on the communication channels and POCs for the coordination.

Establishment of Formal Communication Channels

9.2 Effective mitigation relies on pre-emptive coordination rather than reactive measures. States/Administrations should establish formal communication protocols to ensure any RFI events are promptly coordinated and communicated.

9.3 Each State/Administration should designate operational and technical POCs for GNSS-related matters at both:

a) ATS unit level; and

b) national level (ATM POC).

9.4 These POCs should be:

a) codified in bilateral or multilateral Letters of Agreement (LoA);

b) maintained in an up-to-date regional contact directory; and

c) reviewed and updated annually through ATM/SG meetings to ensure effective coordination and information exchange.

9.5 ATS unit level POCs are designated to coordinate and implement operational measures arising from unforeseen events. Having direct communication links or “hotlines” can facilitate immediate tactical responses, such as traffic rerouting or increasing separation minima.

9.6 National level ATM POCs are responsible for coordinating planned RFI activities to ensure that aviation risks are minimized through prior notification. For ease of having an up-to-date regional contact directory, these national level ATM POCs will be based on the list of ATM POCs (i.e. ATC = Air Traffic Control), as reviewed and updated annually through ATM/SG by ICAO APAC Regional Office.

9.7 In the event that coordination with the designated national level ATM POC cannot be established, the ICAO APAC Regional Office should be notified to facilitate the resolution of GNSS RFI and to mitigate potential safety risks.

Harmonized Regional Coordination

9.8 To support development of a comprehensive regional database of GNSS RFI hot spots, there will be a need for information to be shared and coordinated within the region and should be structured at two distinct levels: pre-tactical and tactical.

9.9 Pre-tactical coordination:

a) pre-tactical coordination supports trend analysis, risk assessment and flight planning considerations;

b) utilizing the standardized reporting mechanisms in Chapter 7, the collation of historical RFI data aids in trend analysis (as detailed in Chapter 8) and supports the identification of geographical areas of concern and commonly reported operational effects to inform the development of mitigation priorities;

c) the resulting regional information may assist aircraft operators in incorporating GNSS RFI awareness into flight planning, navigation contingency and backup considerations, alternate routing where practicable, and flight crew briefings regarding the potential operational effects of GNSS RFI; and

d) in addition, the resulting regional information may enhance ATS unit situational awareness of areas where aircraft may experience loss, degradation, or failure of surveillance or navigation signal transmission, such as ADS-B which could result in incorrect information being displayed to them. Improved awareness supports timely operational responses and reduces the risk of airspace infringements and/or unintended route deviations.

9.10 Tactical coordination:

a) for known or scheduled military electronic warfare training or security operations RFI events, NOTAMs must be disseminated using the harmonized format specified in Chapter 10. Clear, standardized NOTAMs reduce flight crew workload and mitigate the stress associated with sudden system degradations.

9.11 Cross-border notification and procedures:

a) a structured three-phase approach is recommended for managing inter-State RFI events with the flow diagram in **Appendix 4**:

Coordination with ICAO APAC

9.12 States/Administrations should provide consolidated GNSS RFI occurrence reports to the ICAO APAC Regional Office on a semi-annual basis. The regional data collection and analysis process is outlined below:

Phase	**Step**	**Responsible Party**	**Action / Deliverable**	**Timeline**
1. Data Collection and Processing	1.1 Occurrence Reporting	Operators and ANSPs	Operational occurrences reported to the State authority	Real-time / per occurrence
	1.2 State Data Consolidation	National level ATM POC	Consolidation and submission of occurrence data to the ICAO APAC Regional Office	Semi-annually, prior to APRAST meetings
	1.3 Regional Data Consolidation	ICAO Secretariat	Consolidation of regional data and dissemination to relevant working groups	Within 30 days following data submission

Phase	Step	Responsible Party	Action / Deliverable	Timeline
2. Data Analysis and Prioritization	2.1 Safety Risk Assessment	OPS WG and CNS SG	Assessment of operational safety impacts, identification of areas of concern, and prioritization of associated regional safety risks	Conducted through intersessional coordination activities and APRAST meetings
3. Consultation and Regional Action	3.1 Joint Review and Action Planning	OPS WG and CNS SG	Joint review of findings and agreement on appropriate regional actions	Following APRAST meetings
	3.2 Mitigation Measures	OPS WG and CNS SG	Development of operational guidance material, including Regional Aviation Safety Group – Asia Pacific (RASG-APAC) Safety Advisories (RSAs), as appropriate	Prior to RASG-APAC meetings
		OPS WG and CNS SG	Consideration of immediate mitigation measures, including State Letters or other urgent coordination actions, where necessary	As required
4. Progress Reporting	4.1 Outcome Reporting	OPS WG and CNS SG	Reporting of progress, analysis outcomes, and mitigation activities to APANPIRG and RASG-APAC	Through appropriate APANPIRG/RASG-APAC meetings

10. NOTIFICATION OF GNSS RFI EVENTS

GNSS RFI Notifications Mechanism

10.1 This Chapter documents the various notification mechanisms for dissemination of GNSS RFI events. ATS units should select the most efficient means to ensure rapid dissemination of information to all stakeholders as appropriate. These include:

a) **broadcast over VHF**, direct broadcast over the current means of communication established with aircraft in the affected area. This means is for fast and efficient outreach to aircraft already in the affected area but less sustainable for prolonged events;

b) **publication of NOTAM**, coordinate with AIS unit to publish a NOTAM for GNSS RFI event (both planned and unplanned) with short notice. This means will provide advance notice to aircraft about to enter affected areas and allow for mitigating actions such as rerouting or configuration of aircraft to exclude GNSS inputs, if applicable, to be taken; and/or

c) **broadcast on ATIS**, inclusion of information of GNSS RFI events in ATIS broadcast and D-ATIS, where applicable. This means is particularly effective for events occurring in the vicinity of aerodromes as it would ensure aircraft departing and arriving would receive updated information to apply mitigating measures prior to entering the affected area.

10.2 While there are many means of notification available, it is important to determine the appropriate notification mechanism to ensure that information is promptly conveyed to the relevant stakeholders without unnecessary workload. States/Administrations may consider referencing the following decision matrix framework to develop the appropriate notification framework that best suits their environment.

Area Affected	**Notification Mechanism**
Enroute	NOTAM and through ATS unit over VHF
Terminal Control Area	NOTAM and ATIS
Approach	NOTAM and ATIS
Aerodrome	NOTAM and ATIS

10.3 ATS units should also develop their own criteria for the trigger of notification to airspace users considering the following:

a) impact to provision of ATS (i.e. results in changes to the level of service provided);

b) impact to safety of airspace users (i.e. close proximity to airports and approach paths);

c) severity of the occurrence (i.e. large volume of airspace that crosses FIR); and

d) number of airspace users impacted (i.e. small number or all aircraft affected).

GNSS RFI Notification through ATS Units over VHF

10.4 For unplanned GNSS RFI events, aircraft already in the affected area will need to be notified through the ATS units over VHF. Radiotelephony phraseology examples are as follows:

Event	Phraseology
GNSS RFI experienced	GNSS REPORTED UNRELIABLE (*or* GNSS MAY NOT BE AVAILABLE [DUE TO INTERFERENCE]) IN THE VICINITY OF *(location)(radius)* [BETWEEN *(levels)*] e.g. GNSS REPORTED UNRELIABLE DUE TO GNSS JAMMING IN THE VICINITY OF {WAYPOINT}
	GNSS REPORTED UNRELIABLE (*or* GNSS MAY NOT BE AVAILABLE [DUE TO INTERFERENCE]) IN THE AREA OF *(description)* (or IN *(name)* FIR) [BETWEEN *(levels)*]

Note: As there is currently no standard phraseology for flight crew to advise controller that GNSS RFI is no longer present, flight crew may convey this using one of the following:

a) GNSS NO LONGER UNRELIABLE; or

b) GNSS NOW AVAILABLE.

GNSS RFI Notification through NOTAMs

10.5 Currently, the ICAO Navigation Systems Panel has proposed standardized NOTAM codes for GNSS RFI events to differentiate between GNSS jamming or spoofing. This will allow aircraft operators to create effective filtering mechanisms to identify NOTAMs for information related to GNSS RFI events.

10.6 Key elements that should be standardized include:

a) use of Q code:
   i. QGWLF for jamming; or
   ii. a new code that is being developed for spoofing.

b) use of one of the following templates for Item E for GNSS jamming:
   i. GNSS MAY BE UNRELIABLE WITHIN THE VICINITY OF {WAYPOINT};
   ii. GNSS MAY BE UNRELIABLE WITHIN THE VICINITY OF {AERODROME}; or
   iii. GNSS MAY BE UNRELIABLE WITHIN THE AREA OF (description) (or IN (name) FIR) [BETWEEN (levels)].

c) use of one of the following templates for Item E for GNSS spoofing:
   i. GNSS MAY BE MISLEADING WITHIN THE VICINITY OF {WAYPOINT};
   ii. GNSS MAY BE MISLEADING WITHIN THE VICINITY OF {AERODROME}; or
   iii. GNSS MAY BE MISLEADING WITHIN THE AREA OF (description) (or IN (name) FIR) [BETWEEN (levels)].

d) inclusion of instruction for flight crew to report when no longer experiencing GNSS RFI within the area published in the NOTAM for ATS units to follow up with NOTAM cancellation:
   i. FLIGHT CREW TO REPORT IF GNSS INTERFERENCE NO LONGER EXPERIENCED.

e) Sample NOTAM for GNSS signal that is currently subject to jamming interference:

A1311/26 NOTAMN

Q) EACC/QGWLF/I/NBO/AE/000/999/5222N03155W250

A) EADD B) 2611131215 C) 2611132359EST

E) GNSS MAY BE UNRELIABLE WITHIN … FLIGHT CREW TO REPORT IF GNSS INTERFERENCE NO LONGER EXPERIENCED

10.7 Besides the above NOTAM template to raise awareness on the GNSS RFI event, States/Administrations should also separately assess the consequential impact and publish separate NOTAMs for the suspension of services and procedures as appropriate [e.g. suspension of ADS-B services, suspension of free-route airspace/direct routing operations, suspension of CPDLC services, unavailability of RNAV(GNSS) approaches].

GNSS RFI Notification through ATIS

10.8 For GNSS RFI events in the vicinity of aerodrome, ATS units should consider appending information of the GNSS RFI event in the ATIS broadcast and D-ATIS using the following suggested broadcast phrasing:

a) GNSS MAY BE UNRELIABLE WITHIN THE VICINITY OF {AERODROME}; or

b) GNSS MAY BE MISLEADING WITHIN THE VICINITY OF {AERODROME}.

10.9 Similarly, additional information on the suspension of affected approaches should be included as well as the expected alternative procedures.

11. TRAINING REQUIREMENTS

Flight Crew

11.1 Learning:

a) recognize the precursors/threats:

Precursors	**Description**
Jamming	Locally generated RFI is used to "drown out" satellite signals. Possible sources: personal privacy devices, television broadcast station malfunction, and military RFI.
Spoofing	Counterfeit GNSS signals are broadcast and decoded by airborne receivers, resulting in a false position displayed in the cockpit and used by avionics. (Position Manipulation)
Solar Storms	Electromagnetic interference from space weather events such as solar flares "drowns out" the GNSS satellite signals.
Signal Reflection	Reflection and/or refraction of GNSS signals due to objects such as buildings or ionospheric scintillation

b) understanding the possible consequences/impacts:

Systems Affected/Potential Accident Scenarios		**CFIT**	**Midair Collisions**	**Runway Excursion**
Navigation	Downgraded aircraft position computation. GPS (loss of GPS primary)	X		
	Loss of FMS Landing System, GBAS Landing System, SBAS Landing System deviations, and loss of RNP and RNAV capability	X		
	Abnormal differences between ground speed and true airspeed	X		
Surveillance	Loss of Terrain Awareness Warning System (TAWS) Undue TAWS Alerts false "Pull up" calls (or no calls)	X		
	Terrain display shift on Navigation Display	X		
	Loss of ADS-B Out Reporting False ADS-B Out Position Reporting		X	
	Loss of TCAS		X	
Communication	Loss of CPDLC and SATCOM		X	
Others	Loss of Runway Overrun Prevention System or Runway Situation Awareness Tools			X

11.2 Flight planning:

a) checking NOTAMs for information on known or expected GNSS RFI (potential RFI map highlighting possible areas);

b) checking the availability of non-GNSS-based routes, procedures, and approaches (ILS, VOR, and DME); and

c) consider limitations caused by inoperative radio navigation systems to operate in GNSS RFI-affected areas.

11.3 Training for in-flight:

a) communication protocol as per ICAO or other recommended radiotelephony phraseology;

b) determining the start and end of GNSS RFI to react accordingly;

c) reinforce actions taken for Electronic Centralized Aircraft Monitor (ECAM) / Engine Indicating and Crew Alerting System (EICAS) reports and Flight Crew Operating Manual (FCOM), or supplemental procedures for loss of GNSS;

d) guidance from aircraft OEMs on flight deck effects and corresponding actions;

e) plan for rapid transitioning from GNSS to alternative navigation methods; and

f) explore the feasibility of using non installed spoofing detector and EFB to enhance situational awareness of the crew.

11.4 Post-flight:

a) technical report in the maintenance logbook in case any cockpit effects related to GNSS RFI are experienced;

b) establish maintenance/operations feedback after troubleshooting GNSS RFI reports;

c) report any suspected GNSS RFI events to relevant regional and international organizations (e.g. IATA, ANSPs); and

d) when GNSS RFI events have been experienced, aircraft data should be sent to OEMs for further investigation.

11.5 Future fitments:

a) training for mitigation of GNSS RFI onboard: development of Dual-Frequency/Multi-Constellation (DFMC) and Multi-Frequency Multi-Constellation (MFMC) receivers and Minimum Operational Performance Standards (MOPS).

ATS Units

11.6 Learning through briefings and reference to case studies:

a) recognition of GNSS RFI events;

Event	**Signs**
Jamming	Loss of surveillance tracks in ADS-B only environment Reversion to ADS-C tracks
Spoofing	Sudden appearance and disappearance of surveillance tracks in ADS-B only environment Surveillance tracks that do not comply with their flight plan route

b) understanding the impact to service provision; and

Services	**Impact**
ADS-B	Loss of surveillance tracks in ADS-B only environment. Potential reversion to procedural separation.
ADS-C	Loss of Data Link connection ADS-C tracks with low Figure of Merits ADS-C tracks with inaccurate position Potential reversion to traditional longitudinal separation instead of performance-based separation
CPDLC	Receipt of CPDLC messages with send time in the future Receipt of CPDLC messages with large latency Disconnection of CPDLC Potential need for reversion to alternate means of communication
GBAS/SBAS	Unavailability of GNSS-based landing procedures Potential need for reversion to alternate landing procedures (e.g. ILS or visual)
Free Route Airspace / Direct Routing Operations	Potential need for reversion to traditional ATS route for areas outside radar coverage
SATVOICE	Loss of SATVOICE connection Potential reversion to alternate means of communication

c) understanding the impact from flight crew actions.

Flight Crew Actions	**Impact**
Erroneous position reporting	Potential missed position report or need for confirmation of position with other sources
Response to false terrain awareness and warning system alerts	Sudden climb or descend that could result in conflict with other aircraft
Degraded navigation performance	Inability to fly certain route and approach procedures and may require radar vectors
Inability to recover even after leaving affected area	Inability to fly certain route and approach procedures and may require radar vectors

11.7 Training

a) besides recognizing GNSS RFI events and its consequential impact to services and potential actions by flight crew, it is important that these are also incorporated into refresher simulator trainings to ensure familiarity and competency in handling abnormal operations and activation of contingency procedures.

CNS Units

11.8 Learning through courses to improve knowledge in the following areas;

a) recognition of GNSS RFI events through monitoring of system health and time synchronisation errors; and

b) recognition of GNSS RFI events through analysis of available data fields that can signify suspected events.

11.9 Training:

a) software application training that support investigation and analysis of data; and

b) contingency procedures training to ensure time synchronisation issues can be mitigated through switching to alternate time sources.

12. CONCLUSION

12.1 The global aviation system has become increasingly dependent on GNSS to support CNS and timing functions. While GNSS enables significant operational efficiencies and capacity improvements, this reliance also introduces systemic vulnerabilities. Intentional and unintentional interference, signal manipulation, and broader space-based system disruptions have the potential to adversely affect aviation safety and operational continuity across wide geographic areas.

12.2 Beyond localized interference events, more complex crisis scenarios including deliberate disruption of satellite services, spoofing activities, satellite malfunction, or large-scale orbital debris events such as the Kessler Syndrome illustrate the importance of resilience planning. Although such scenarios may be low in probability, their operational consequences could be significant. Accordingly, strengthening resilience to GNSS RFI contributes not only to interference mitigation, but also to broader contingency preparedness and system robustness.

12.3 This document provides a structured framework to assist States/Administrations, ANSPs, aircraft operators, aerodrome operators and other stakeholders in policy development, contingency planning, operational detection, reporting of GNSS RFI events, coordinated regional response, harmonized classification of GNSS RFI events, and post-event analysis and continuous improvement.

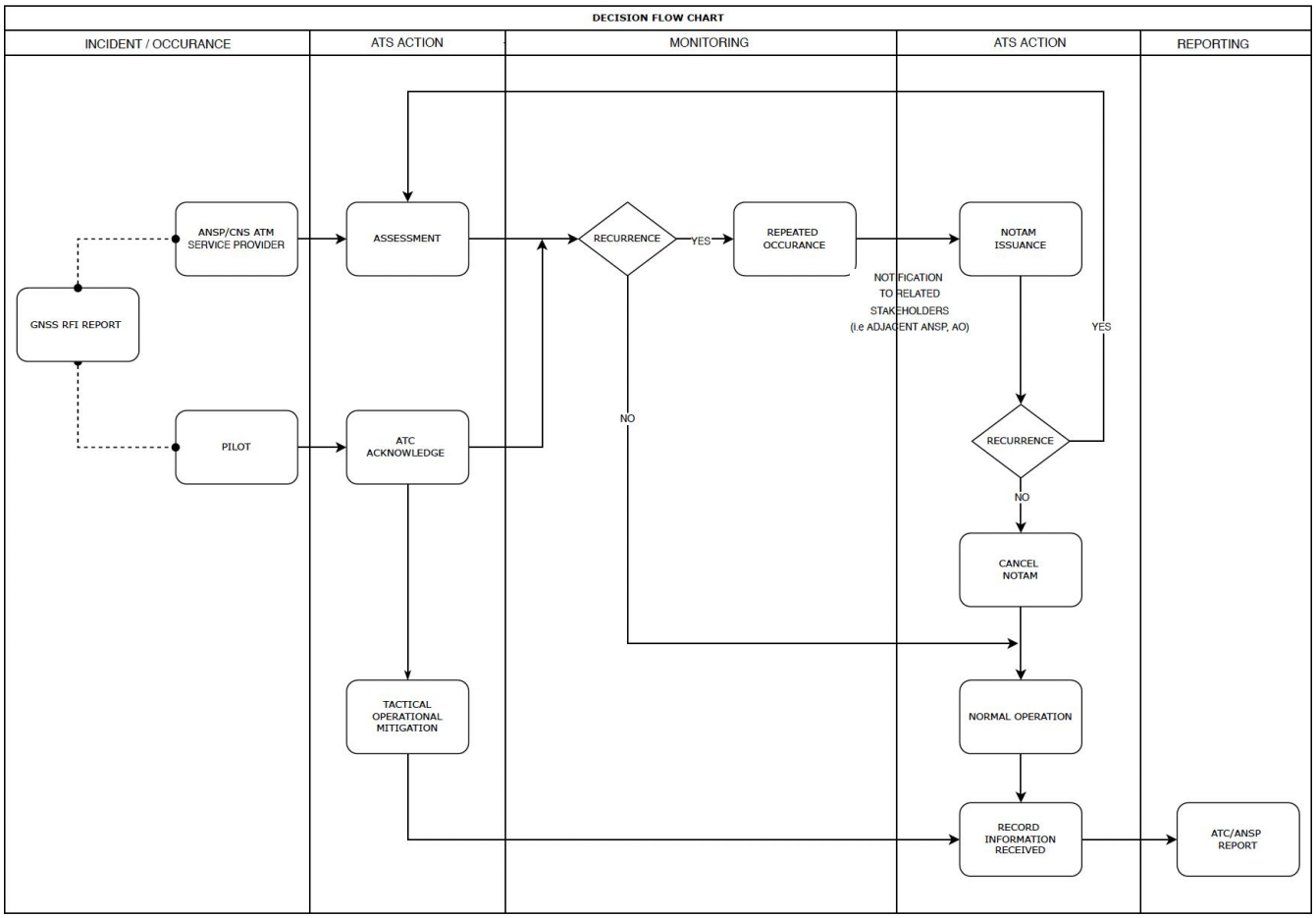
12.4 The establishment of standardized procedures for detection of GNSS and its associated data link disruption, classification and reporting support the development of an effective regional coordination network. Such harmonization enhances situational awareness, promotes transparency, and facilitates timely mitigation measures across FIR boundaries.

12.5 Given that GNSS RFI is inherently transnational in nature, sustainable solutions require coordinated regional and global approaches. Continued collaboration among ICAO regions, led by ICAO Headquarters, will support harmonization of procedures and future development of SARPs and related guidance material as the threat environment evolves.

12.6 Close coordination with international organizations such as Airports Council International (ACI), IATA, the International Federation of Airline Pilots' Associations (IFALPA), and the International Federation of Air Traffic Controllers' Associations (IFATCA) remains essential to ensure harmonized implementation across all aviation domains.

12.7 Through proactive coordination, standardized reporting, and collective commitment to resilience, the aviation community can mitigate the operational and safety risks associated with GNSS RFI and preserve the integrity, continuity and safety of international civil aviation.

APPENDIX 1: ATS UNIT HANDLING OF GNSS RFI EVENT



APPENDIX 2: SAMPLE POST-FLIGHT REPORTING DATA ELEMENTS

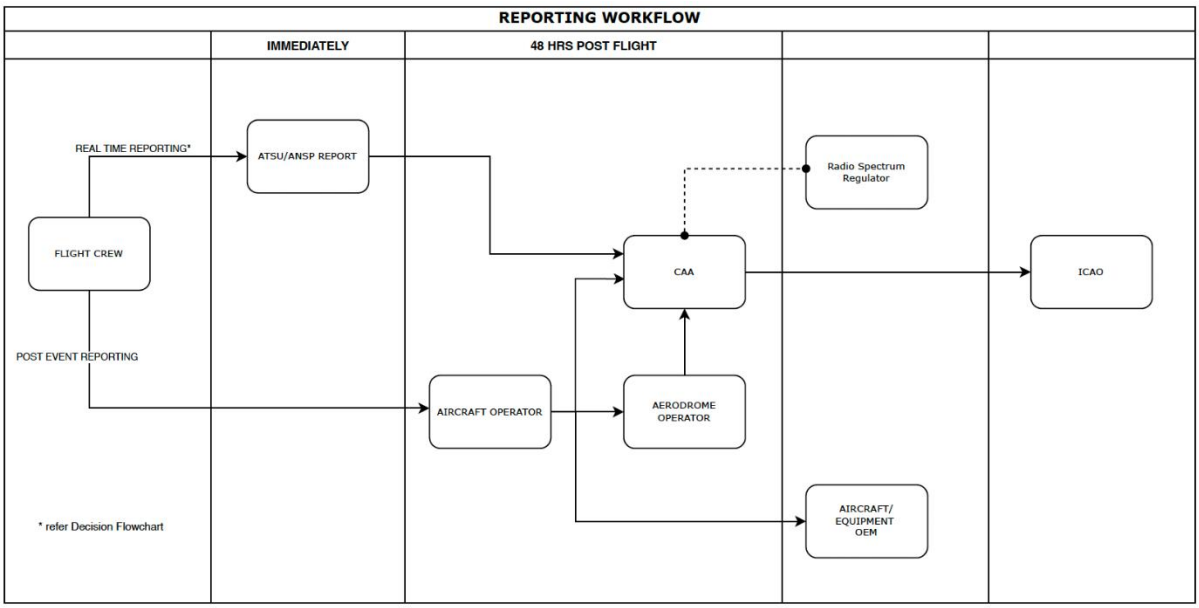
GNSS RFI REPORTING FORM FOR USE BY ANS PERSONNEL	
Description of interference	
Source of initial interference report	[ ] Flight crew [ ] Engineer/technician [ ] Other
Observability of the interference	Interference was noticeable: [ ] only on board the aircraft (flying, not on the ground) [ ] only on the ground (aircraft parked/taxiing) or by means of ground detection systems available [ ] both
Number of received reports	
Coordinates of the area of occurrence/time (UTC)	UTC: ___ Lat: ___ Long: ___ FL/Altitude: ___
Problem duration:	Days, hours, minutes, seconds _____ [ ] continuous [ ] intermittent
Affected GNSS element	[ ] GPS [ ] GLONASS [ ] GALILEO [ ] BDS [ ] Other constellation [ ] EGNOS [ ] WAAS [ ] BDSBAS [ ] Other SBAS [ ] GBAS (VHF data link for GBAS)
Affected constellation frequency	[ ] L1 [ ] L5 [ ] Both
Used GNSS contingency procedure	[ ] Radar vectoring [ ] Switch to procedures based on conventional navaids (e.g. DME/DME or VOR/DME-based PBN, DME and VOR-based conventional, ILS) [ ] Diversion to another airport [ ] Missed approach [ ] Use of alternate means for communication (e.g. VHF) [ ] Other: ___
In case of report by flight crew	
Airline name	
Aircraft type and registration	
Flight number	
Airway/route flown	
Reported on-board failure	[ ] Total loss of navigation capabilities [ ] Need to change the navigation procedure [ ] Inability to fly RNP and request for radar vectoring [ ] Inability to fly a GNSS-based approach (GLS, SLS) [ ] GNSS fault (1 or 2)

	[ ] TAWS/EGPWS warnings or loss of terrain and surface functionalities [ ] Loss of ADS-B [ ] Wind and ground speed wrong presentations [ ] Aircraft clock anomaly [ ] Loss of situational awareness (SVS, Cockpit Display of Traffic Information) [ ] Loss of communication functions (CPDLC, ACARS) [ ] AHRS failure [ ] Map shift [ ] Other: ___
Information on presumed source of interference	
Presumed location of interference source	Lat: ___ Long: ___ or Nearest city or landmark:
Interfering frequency (if known)	
Signal strength and reference bandwidth (if known)	
Further descriptions of the interference case	[ ] Spectrum plot [ ] Map [ ] Other material:

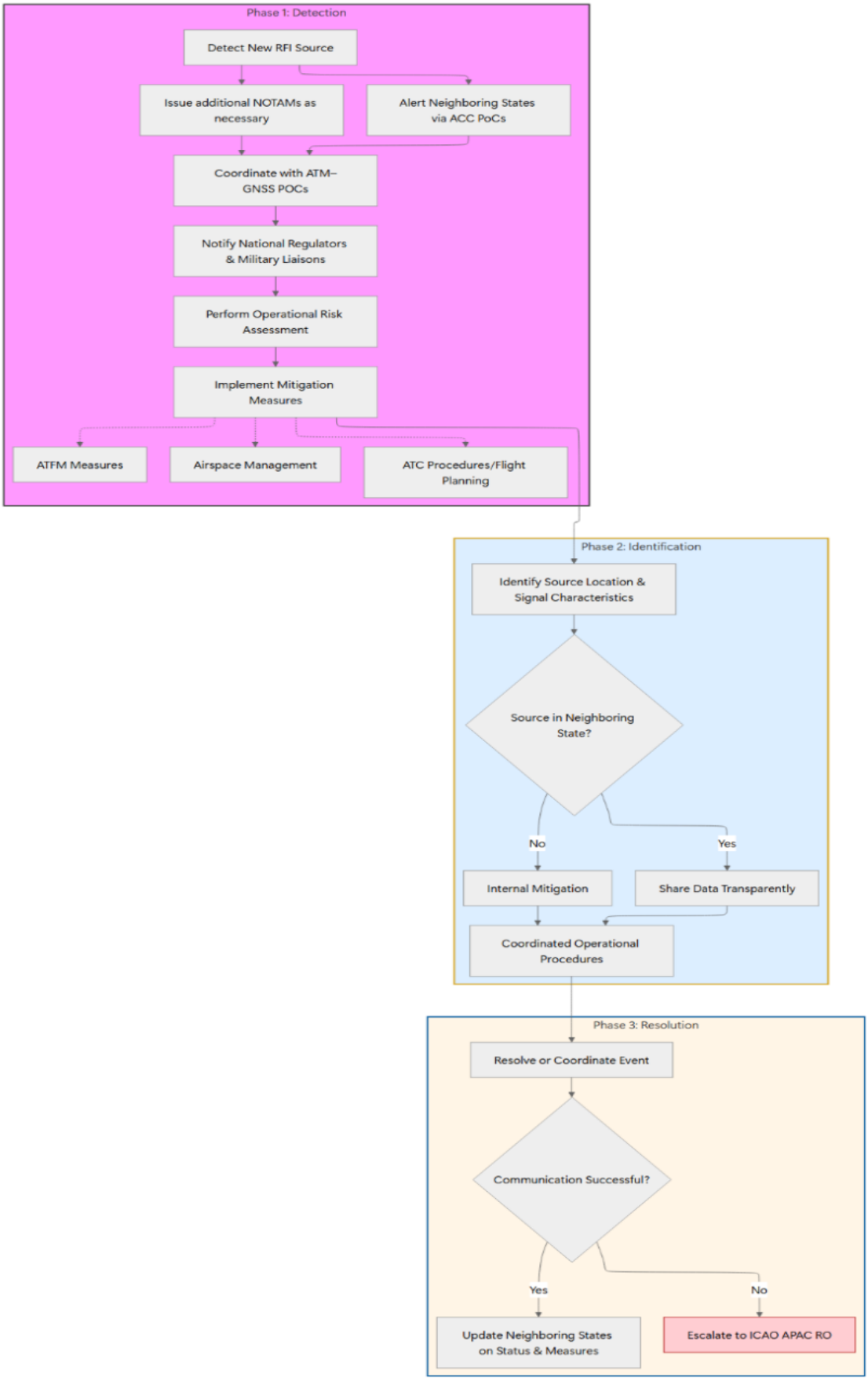
GNSS RFI REPORTING FORM FOR USE BY FLIGHT CREW	
Description of interference	
Reported failure and operational impact	[ ] Total loss of navigation capabilities [ ] Need to change the navigation procedure [ ] Inability to fly RNP and request for radar vectoring [ ] Inability to fly a GNSS-based approach (GLS, SLS) [ ] GNSS fault (1 or 2) [ ] TAWS/EGPWS warnings or loss of terrain and surface functionalities [ ] Loss of ADS-B [ ] Wind and ground speed wrong presentations [ ] Aircraft clock anomaly [ ] Loss of situational awareness (SVS, Cockpit Display of Traffic Information) [ ] Loss of communication functions (CPDLC, ACARS) [ ] AHRS failure [ ] Map shift [ ] Other: ___
Used GNSS contingency procedure	[ ] Request for radar vectoring [ ] Switch to another mean of navigation (e.g. DME/DME, VOR/DME, ILS) [ ] Diversion to another airport [ ] Missed approach [ ] Use of alternate means for communication (e.g. VHF) [ ] Other: ___
Affected GNSS element	[ ] GPS [ ] GLONASS [ ] GALILEO [ ] BDS [ ] other constellation

	[ ] EGNOS [ ] WAAS [ ] BDSBAS [ ] other SBAS [ ] GBAS (VHF data link for GBAS)
Affected constellation frequency	[ ] L1 [ ] L5 [ ] Both
Aircraft type and registration	
Flight number	
Airway/route flown (airport RWY/gateway/parking gate in case of on ground detection)	
Coordinates of the area of occurrence/time (UTC)	UTC: ___ Lat: ___ Long: ___ FL/Altitude: ___
Problem duration	Days, hours, minutes, seconds _____ [ ] continuous [ ] intermittent

APPENDIX 3: GNSS RFI AND ASSOCIATED DATA LINK DISRUPTION REPORTING WORKFLOW



APPENDIX 4: CROSS-BORDER COORDINATION PROCEDURES



Phase 1: Detection

1.1. Upon detecting a new GNSS RFI event, the affected ATS units should:

a) immediately alert adjacent ATS units of the affected area via established ATS unit level POCs;

b) assess the need for issuance or amendment of NOTAMs; and

c) implement immediate tactical mitigation measures, as required.

1.2. Concurrently, ATS unit level POCs should coordinate with and notify the national level ATM POCs to enable:

a) coordination with national frequency regulators and military liaisons;

b) technical investigation and analysis of the GNSS RFI source; and

c) coordination of additional operational mitigation measures with affected States/Administrations and relevant service providers after completing the operational risk assessments (details in Chapter 8).

1.3. Mitigation measures may include:

a) airspace management actions;

b) air traffic flow management measures;

c) revised air traffic control procedures; and

d) flight planning advisories.

1.4. Operational risk assessment should guide the selection of mitigation measures.

Phase 2: Identification

1.5. National level ATM POCs should cooperate to identify:

a) the source location;

b) signal characteristics (e.g. centre frequency and bandwidth), and

c) expected duration or operational parameters.

1.6. Where the source is located within another State/Administration, relevant data should be shared transparently. It must be noted that while some sources (e.g. national security) may not be deactivated, their impact can be mitigated through coordinated operational procedures.

Phase 3: Resolution

1.7. Once the RFI event is resolved or sufficiently coordinated, the national level ATM POC should provide an update to relevant States/Administrations regarding the status of the interference, any remaining limitations, and the specific mitigation measures taken.

1.8. If coordination or resolution between the national level ATM POCs is unsuccessful, the ICAO APAC Regional Office should be informed to assist in facilitating resolution and safeguarding aviation safety.

Aerodromes to be listed in Asia Pacific Air Navigation Plan [Updated on 22 January 2026]

S. No	Sub-region	State / Admin	ICAO Code	Name of City	Name of Aerodrome	Type	APAC ANP
1	SA	Afghanistan	OAHR	Herat	Herat Intl	UNK	0
2	SA	Afghanistan	OAMS	Mazar-e-Sharif	Mazar-e-Sharif	UNK	0
3	SA	Bangladesh	VGCB	Cox's Bazar	Cox's Bazar Intl	UNK	0
4	NA	China	RCYU	Hualien	Hualien	UNK	0
5	NA	China	RCMQ	Taichung	Cingcyuangang	UNK	0
6	NA	China	RCNN	Tainan	Tainan	UNK	0
7	SA	India	VICG	Chandigarh		UNK	0
8	SA	India	VOGO	Goa	Dabolim	UNK	0
9	SA	India	VEGK	Gorakhpur	Mahayogi Gorakhnath	UNK	0
10	SA	India	VIDX	Hindan	Hindon	UNK	0
11	SA	India	VOHY	Hyderabad	Hyderabad International Airport	UNK	0
12	SA	India	VIJO	Jodhpur	Jodhpur	UNK	0
13	SA	India	VEIM		Imphal Airport	UNK	0
14	SA	India	VOGA		Manohar International Airport, MOPA, GOA	UNK	0
15	SA	India	VOPB	Port Blair	Veer Savarkar Intl	UNK	0
16	SA	India	VAPO	Pune	Jagadguru Sant Tukaram Maharaj	UNK	0
17	SA	India	VISR	Srinagar	Srinagar	UNK	0
18	SA	India	VOTP		Tirupati Airport	UNK	0
19	SA	India	VOVZ	Visakhapatan	Visakhapatnam Intl	UNK	0
20	NA	Japan	RJAH	Hyakuri		UNK	0
21	NA	Japan	RJNK	Komatsu		UNK	0
22	NA	Japan	RJOS	Tokushima		UNK	0
23	NA	Japan	RJOH	Yonago	Miho	UNK	0
24	PAC	Micronesia	PTSA	Kosrae I.	Kosrae	UNK	0
25	NA	Mongolia	ZMCD	Dornod	Choibalsan	UNK	0
26	PAC	N. Mariana Is.	PGWT	Tinian I.	West Tinian Tinian Intl	UNK	0

S. No	Sub-region	State / Admin	ICAO Code	Name of City	Name of Aerodrome	Type	APAC ANP
27	PAC	Solomon Islands	AGGM	Munda	Munda Intl	UNK	0
28	SEA	Timor Leste	WPOC	Oe-Cusse	Rota de Sândalo Intl	UNK	0
29	PAC	Vanuatu	NVVW	Tanna	Tanna	UNK	0
30	SEA	Viet Nam	VVDL	Da Lat	Lien Khuong	UNK	**0**

Australia: Need to finalize the Table
AOP II -1, APAC ANP V-II.

US

(1) Tinian I./West Tinian [PGWT] for N. Mariana Is. should be added in Table AOP I – 1 of APAC ANP V - I and Table AOP II – 1 of APAC ANP V - II.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA/PACIFIC REGIONAL GUIDANCE ON

RISK ASSESSMENT AND MITIGATION MEASURES FOR LIGHTS WITH THE HAZARDOUS EFFECTS

Version 1.0, DD MM YYYY

This guidance material was developed by the Asia Pacific Aerodrome Design and Operation Task Force (AP-ADO/TF).

It was approved by AOP/SG/… (DD MM 20xx) and published by ICAO Asia and Pacific Office, Bangkok.

ICAO Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services and Manuals shall take prevalence in the event of any conflict between the provisions in the aforementioned documents and this guidance material.

Comments on this guidance material may be sent to ICAO Asia and Pacific Office at apac@icao.int.

RECORD OF AMENDMENTS

AMENDMENTS				AMENDMENTS			
No	Date applicable	Date entered	Entered by	No	Date applicable	Date entered	Entered by

TABLE OF CONTENTS

FOREWORD

Annex 14, Volume I – Aerodrome Design and Operations provide following provisions regarding lights which may endanger the safety of aircraft and/or cause confusion.

Lights which may endanger the safety of aircraft

5.3.1.1: A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

Lights which may cause confusion

Recommendation 5.3.1.3: A non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights should be extinguished, screened or otherwise modified so as to eliminate such a possibility. In particular, attention should be directed to a non-aeronautical ground light visible from the air within the areas described hereunder:

a) Instrument runway − code number 4:

within the areas before the threshold and beyond the end of the runway extending at least 4 500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width.

b) Instrument runway − code number 2 or 3:

as in a), except that the length should be at least 3 000 m.

c) Instrument runway − code number 1;
and non-instrument runway:

within the approach area.

In Aerodrome Design Manual (Doc 9157), Part 4 – Visual Aids, the following provisions are elaborated:

1.2.29 Visual acuity and sensitivity to glare vary from pilot to pilot and are partly determined by age, fatigue and adaptation to prevailing light levels. Moreover, a given pilot's abilities, reactions and responses will vary from day to day. Also, the visual guidance system must be able to accommodate variations in pilot proficiency.

14.2.2 The pilot mainly relies on apron floodlighting when taxiing on the apron. Uniform illuminance of the pavement within the aircraft stand and elimination of glare are major requirements. On taxiways adjacent to aircraft stands, a lower illuminance is desirable in order to provide a gradual transition to the higher illuminance on the aircraft stands.

To provide further guidance on managing the non-aeronautical ground lights at or in the vicinity of the aerodrome the Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF) has developed this Guidance Material based on currently available State's good practices and approved by AOP/SG/… This guidance material restricts its scope only for managing the non-Aeronautical ground lights near the Aerodrome and excludes the glare produced due to solar panels or other reflective surfaces used at Airports.

1.0 INTRODUCTION

1.1 With the technological advancement, still the safe operations of the aircraft rely on pilots' ability to process the visual field at different instances with respect to the aircraft position. Any visual field unfolded if it is against expectation or interference could lead to erroneous decisions, further contributing to an incident or accident. Pilots can encounter non-aeronautical lighting which could be hazardous and create an uncomfortable state and sometimes with greater exposure time can lead to severe discomfort impacting the specific phase of the operations.

1.2 Along with the growth of the airports, the areas surrounding the airports have also attracted economic interests resulting in high rise structures, commercial buildings, roads, and railways facilitating passenger needs. With these structures coming up, extraneous lighting has become a common phenomenon, in some cases, this can also be hazardous, which, if not attended could create disturbances to the visual field of the pilot. Some States already have regulations on monitoring and mitigating these non-aeronautical ground lights.

1.3 Several incidents and accidents are associated with visual disturbances, which when the eyes are adapted to low-light levels, exposure to bright light can result in temporary visual impairment due to glare, flash blindness, and afterimages, further limiting the pilot's response time. These accidents are recorded to have occurred in the majority in landing, departure phases and during taxiing. In some cases, ground personnel and air traffic controllers can also be impacted due to this glare. Flash blindness and after image effects are the usual outcomes after affected by a glare and this could be probable cause of distraction to the pilot's visual field of the pilot impairing safety of the operations. Aerodrome design Manual (Doc 9157) part 4, chapter 14, has laid enough stress on glare analysis and mitigation measures to ensure the glare is limited eventually improving the visual field processing by the pilot.

1.4 Although several other sources of glare such as intense sunlight, solar panels at nearby locations and within the airports etc., are contributing factors, the guidance material here focusses on the impact and the remedial measures, especially for the non- aeronautical ground lights creating visual disturbance to the pilots. Pilots normally in the night conditions adapt to the low light levels and when suddenly exposed to the bright light levels can result in temporary visual impairment, flash blindness and after images. This would be a critical concern for the pilots.

1.5 The probable non-aeronautical ground lights (direct or reflected source) near and within the aerodrome are the following:

a) Flashing/high intensity/strobe lights from nearby high-rise structures, stadiums, function halls, LED advertising displays and commercial buildings where bright lights are used which could produce glare.

b) Improper design and orientation of apron flood lighting created glare during manoeuvre of the aircraft.

c) Glare which is produced due to solar power panels installed near the aerodrome.

d) The possibility of mistakenly identifying a non – aeronautical ground light as an aeronautical ground light.

e) Probable concerns with patterns creating ambiguity with that of AGL systems.

f) Lights from emergency vehicles within the Airport.

g) Perimeter lighting usually will be encountered by pilots during landing and take-off.

1.6 The above phenomenon is a common and obvious reason for causing distraction to the pilot thereby impacting the safety of the operations. Based on the above discussion, the non-aeronautical ground lights can produce glare or a distraction (produced due to a bright source of light) or perceiving of the non-aeronautical ground lighting system as aeronautical ground lighting system etc. Hence, the above aspects would be discussed and addressed going forward.

1.7 The significant feature of glare is its "Variability" factor. Glare is not constant and can vary based on human factors such as age, eye-pigment which has an impact on individuals tolerance to glare, specific eye conditions, the point of observation, height, angle of observation, exposure time to glare, wind screen conditions, colour of the light & its ambient conditions, phase of the aircraft (such as landing, take -off, short final approach etc.,) etc. Based on above factors, although the glare may be calculated, considering its variability in nature, however, the tolerance factor is influenced by several other aspects which are specific in nature for an individual and the circumstances.

2.0 SCOPE OF THE GUIDANCE MATERIAL

2.1 This guidance document was prepared by the small working group (SWG) formed as per the decision taken for further reviewing the paper submitted by INDIA in the ADO/TF 5/4 on Regional Guidance on "Risk Assessment for Lights with the Hazardous Effects". India has led the group and the SWG consists of experts from India, Nepal, Republic of Korea and Thailand.

2.2 The need of the guidance for assessing the non-aeronautical ground lights which could have hazardous effects on the operations has been discussed in the paper and the probable scenarios have been discussed in this context.

2.3 Also, the steps taken by several other State regulators in assessing the risk associated with the non-aeronautical ground lights and the procedures implemented by the specific State has been discussed.

2.4 The objective of this guidance material is to provide the regional guidance for mitigating the serious hazard to the aircraft operations by the lights other than aeronautical ground lighting system. The guidance material focusses on possible hazardous lights near the aerodrome and the possible solutions which could be implemented at Airports which includes from the design stage.

2.5 The guidance material would help in:

a) Assessing the lights which endanger the safety of the aircraft.

b) Considering the design aspects of road lighting, especially where such lighting is improperly designed, can be confused with approach lighting when installed near the approach areas during landing.

c) Considering the design aspects of the apron flood lighting with minimum glare possible.

d) Assessing the hazardous non-aeronautical ground light which needs to be extinguished, obscured and mitigated as appropriate.

The terms associated with the above factors are glare, flash blindness and after image effects etc. The paragraphs below explain these concepts in different phases in which these can turn into hazards, impacting regular operations.

3.0 DEFINITIONS

Aeronautical ground light (AGL): Any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

Non- Aeronautical ground light: This refers to the source of the light which is not part of the Aeronautical ground lighting system and causing discomfort due to glare, flash blindness, misleading or confusing patterns to the pilot during landing, take off and manoeuvring

Upward light ratio (ULR): Upward Light Ratio (ULR) is the proportion of light from a system (direct and reflected) that is emitted above the horizontal axis.

Colour Coded Zoning Map (CCZM): A Colour Coded Zoning Map is an aeronautical planning tool that visually represents the permissible building or structure heights around an aerodrome, based on its Obstacle Limitation Surfaces and airspace protection criteria.

Glare: Glare is usually defined as a temporary sensation produced by luminance within the visual field that is significantly greater than that to which the eyes can readily respond to and is not associated with biological damage. It is a vision impairment produced by intense light, and it can occur either directly or by reflection. It occurs whenever there is a high contrast between a light source and the object(s) a person is trying to focus on. *(Source: Glare as a Mechanism of the Motion of an Aircraft Through the MIRCE function ability localizer Field).*

Flash blindness – A visual interference effect that persists after the source of illumination has been removed.

Afterimage – A transient image left in the visual field after an exposure to a bright light.

Above Mean Sea Level (AMSL) – It is a vertical reference used to describe the elevation or height of a point relative to the average sea level on Earth.

4.0 Guidance on Managing of Non – Aeronautical ground lights at Aerodromes.

4.1 The non-aeronautical ground lighting refers to the source of the light which is not part of the Aeronautical ground lighting system and causing discomfort due to glare, flash blindness, misleading or confusing patterns to the pilot during landing, take off and manoeuvring. Such sources of light generally include road lighting inside the airside as well as city road lights, hoardings, high rise structure lighting, Strobe lighting and apron flood lighting.

4.2 Road lighting installed in the approach phases could disrupt the visual field of pilot during the approach. In some cases, road lighting may cause misleading patterns which could be perceived as approach lighting or other runway lighting systems. These lights should be positioned to not focus aiming towards the aircraft causing glare or the flash blindness. Figure 1 refers to the possible recommended position and aiming angles of the lights of the airside perimeter and the outside road lighting, especially in the approach zone, which should suffice the required illumination levels on the roads and at the same time ensure the lights are also not disturbing the visual field. If the same is not feasible, the lighting aiming angles should be tilted so to ensure that the glare caused due to the aiming angle is minimized to the possible extent. Special care is to be taken to keep the upward light ratio as minimum possible to ensure the lighting is not spilled over above the horizontal. This also applies to the apron flood lighting design to ensure minimum light spillage over above the horizontal which further may contribute to the glare and other factors.

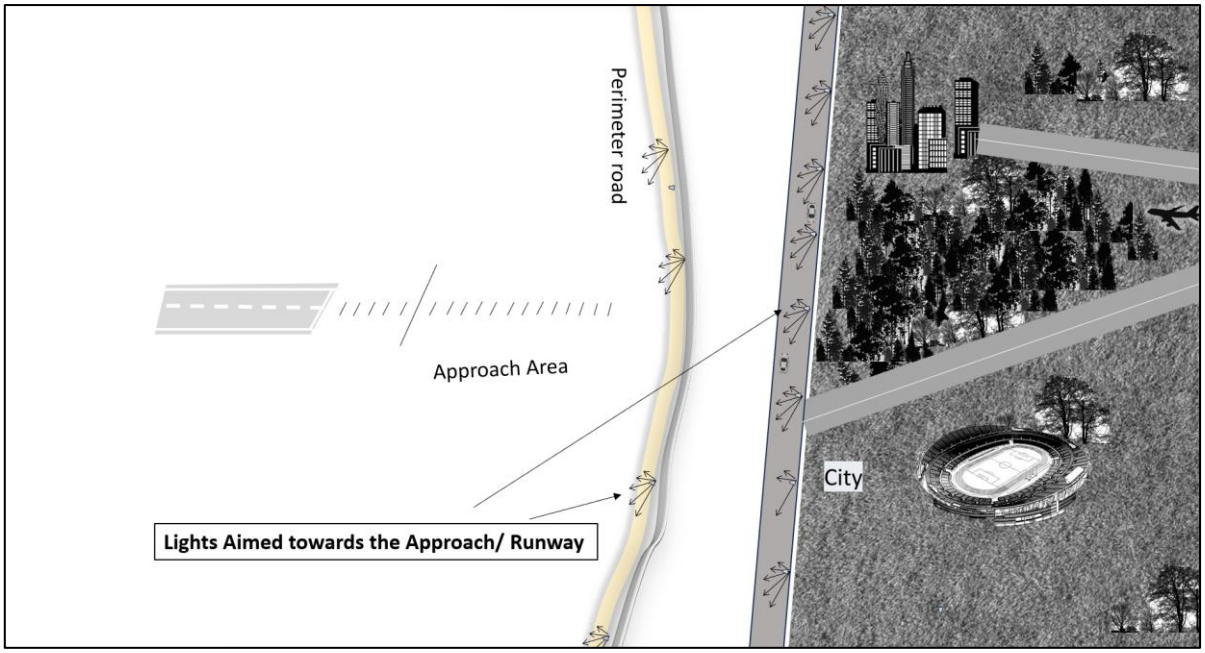


Figure 1. Aiming angle of the road light fixtures in approach area

4.3 The aiming angle of the perimeter and city road lighting should be faced away from the landing aircraft. This will eliminate the risk of glare and other sorts of distortion especially during landing. While, when aimed, it is also necessary to take care not to disturb the take-off aircraft also. As per the study, aviation incidents pertaining to visual aids predominantly occur in the approach zone. Airports should consider all the factors which disturb the visual field of the pilot in this zone.

4.4 The lighting from the high-rise structures and facilities like stadiums, function halls etc., located near or surrounding the airport should be regulated to ensure flashy lighting, strobe lighting, and lights intercepting the aircraft are avoided. Constructions surrounding the airport should be guided to reduce the lighting elevation angle to the extent possible. The pattern of the lights should not resemble the runway lighting over the high-rise structures and other constructions. Airports should prepare local procedures which will enable them to establish the process of identification of such sources of non-aeronautical ground lights. Obstruction lighting should be installed to denote the obstacles as guided in Chapter 6 of ICAO Annex 14 Volume I – visual aids for denoting obstacles. A periodic survey to be conducted by airports for any such deviations and to be aligned to the requirement. Pilot inputs to be taken, during coordination meetings or any other forums periodically to understand any such lighting which is affecting the visual field and appropriate action to be carried out.

4.5 Apron flood lighting could be one of the sources of glare if not designed properly. Enough care should be taken to ensure the lights are designed to not cause any discomfort to the manoeuvring or the landing/take-off aircraft. Guidance on aiming for the flood lighting is provided in Aerodrome Design Manual (Doc 9157), Part 4 – Chapter 11. During rain, chances are that a thin water film may form intermittently over the pavements, which could produce glare. Also, enough care is to be taken at the design stage to ensure that the flood lighting is not focused on the runway/ taxiway. The glare effect sometimes on these surfaces obscures the markings. Special attention should be taken by airports while designing apron pavements to ensure adequate slope is provided for effective drainage of water. ULR also should be taken care of at design stage itself to ensure the proper aiming.

4.6 Apart from the above lights, the neon/ LED hoardings (refer Appendix B) and even the sunlight reflecting from solar panels installed nearby can be a hazard to the aircraft especially on final approaches. To mitigate such hazards, State should formulate a procedure wherein the glare analysis

should be conducted by a specialist agency before allowing installation of such lights, solar panels or hoardings close to airport especially on approach and take off path of the aircraft. In addition to the assessment of the glare to aircraft landing and taking off, the glare to ATC controllers may also be assessed.

5.0 References from States' regulatory standards/practices on hazardous lights

5.1 CASA Australia

Part 139 (Aerodromes) Manual of Standards 2019, Chapter 9 — Visual aids provided by aerodrome lighting, Division 16 — Monitoring, maintenance and serviceability of aerodrome lighting

https://www.legislation.gov.au/F2019L01146/latest/downloads

9.143 Other lighting on the aerodrome

……..

(5) An aerodrome operator must immediately notify CASA in writing of any proposals to install or use any installation, equipment or laser within the aerodrome boundary which will have any of the following kinds of lighting:

(a) multiple light colours emitting from a single source;

(b) rapid changes in light colour;

(c) flashing lights.

Note Coloured lights, flashing lights or lasers may cause a hazard to aircraft operations irrespective of their intensity.

(6) An aerodrome operator must not proceed with any proposal mentioned in subsection (5) until CASA has assessed, and approved in writing, the lighting intensity proposed for the installation, equipment or laser.

(7) Subsections (3), (5) and (6) do not apply to the following:

(a) visual aids required for aircraft operations;

(b) signalling equipment;

(c) visual aids required for road safety.

(8) An aerodrome operator must immediately notify CASA in writing of any proposals for equipment or lighting installation within the aerodrome boundary which would reflect sunlight, including solar panels, mirrors or reflective building cladding.

(9) An aerodrome operator must not proceed with any proposal mentioned in subsection (8) unless CASA has determined, in writing, that it will not cause a hazard to aircraft operations.

(10) CASA may direct the aerodrome operator, in writing, that an installation, equipment, laser or reflective source within the aerodrome boundary must be modified, shielded, or extinguished to ensure aviation safety.

Note Certain lights might cause confusion, distraction or glare to pilots in the air. Ground lights may cause confusion or distraction by reason of their colour, position, pattern or intensity of light emission

above the horizontal plane. Under regulation 94 of the CAR, CASA may issue notices about dangerous lights, and it is an offence to fail to comply with any directions in a notice.

9.144 Lights — requirements for zones

(1) This section does not apply to the lights mentioned in paragraphs 9.143 (7) (a), (b) and (c).

(2) Lights installed at an aerodrome must comply with the zone requirements as shown in Figure 9.144 (2).

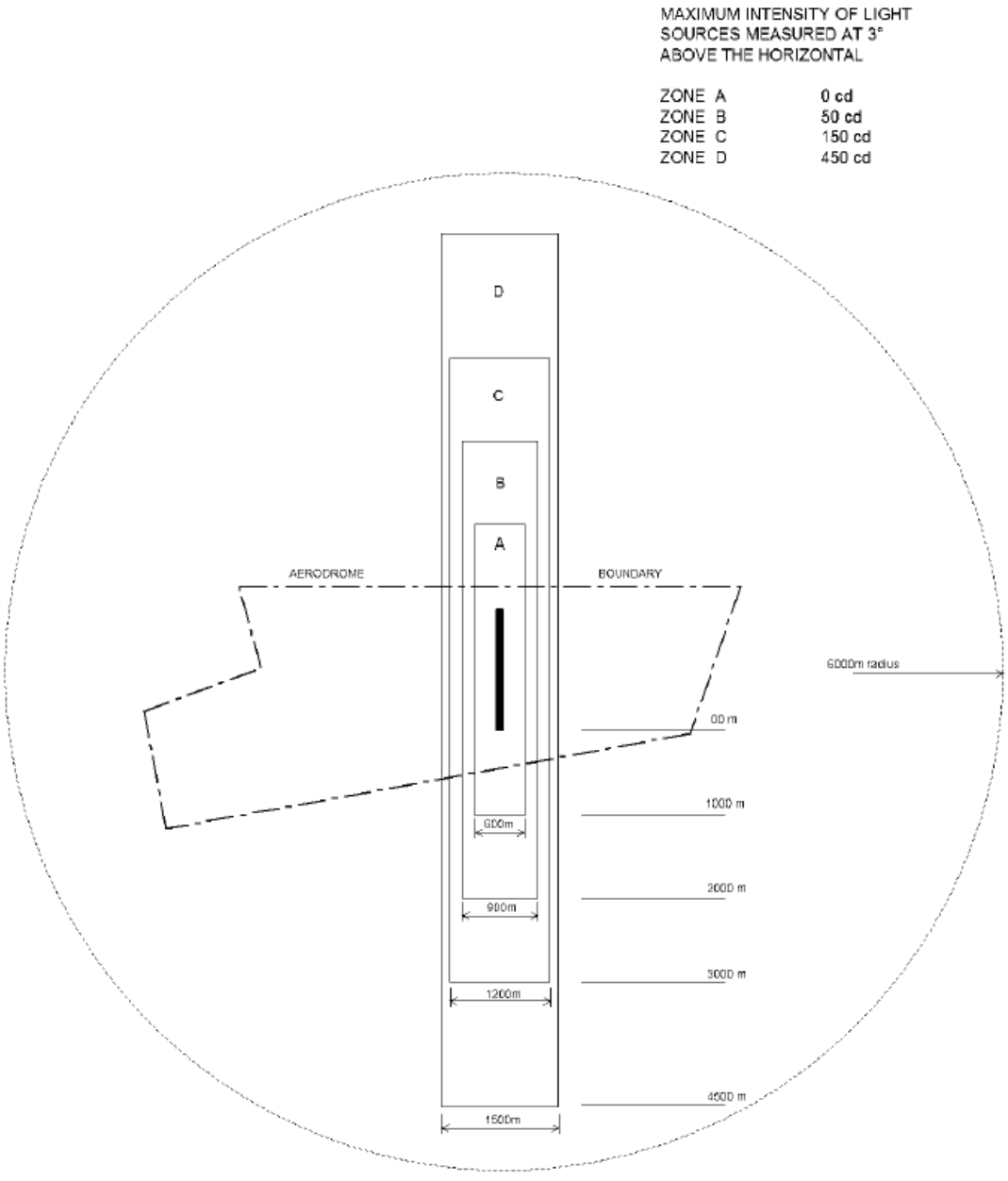


Figure 9.144 (2) Zone requirements for lighting (shows matters)

5.2 UK CAA

CAP 738: Safeguarding of Aerodromes

https://www.caa.co.uk/our-work/publications/documents/content/cap-738/

Chapter 3: The Safeguarding Process

Safeguarding Assessment

3.2 The assessment should include, as a minimum, the impact of:

……..

;

*d**) any development which may affect the performance of navigation aids.***

e) the use of hazardous, confusing and misleading lights;

f) the use of highly reflective surfaces which may cause dazzling;

……..

Requesting Planning Conditions

……

*3.6 When the safeguarding assessment identifies the need for 'planning conditions', the aerodrome operator should explicitly request such conditions in their response to the Local Planning Authority (LPA); this is particularly important where landscaping features have the potential to introduce an increased bird strike risk, or **where lighting could present a hazard to aviation safety**. Where such conditions have been requested, aerodrome operators should work collaboratively with developers and the LPA to ensure those conditions are discharged by the LPA, where possible, to the satisfaction of the aerodrome.*

……..

Lighting

3.17 Lighting elements of developments have the potential to distract or confuse pilots, particularly in the immediate vicinity of an aerodrome.

3.18 Aerodrome operators, LPAs and developers should pay attention to the intensity and alignment of road lighting, which is a matter of concern over much more than the areas close to the ends of a runway. The intensity of lighting can cause confusion to pilots by creating glare when viewed from the air; a road lighting scheme may give an illusion similar to an approach or runway lighting pattern which may confuse pilots who use such visual cues when landing at night or in low visibility conditions.

3.19 Where floodlighting is proposed, the aerodrome operator should request that the lighting scheme provides full cut-off with no light spill above the horizontal.

3.20 Article 224 of the Air Navigation Order 2016 (as amended) is explicit regarding lights liable to endanger aircraft, including the directions to be taken to extinguish any such light deemed as endangering aircraft.

5.3 FAA

Airplane Flying Handbook (FAA-H-8083-3C)

Airport and Navigation Lighting Aids

The lighting systems used for airports, runways, obstructions, and other visual aids at night are other important aspects of night flying. Lighted airports located away from congested areas are identified readily at night by the lights outlining the runways. Airports located near or within large cities are often difficult to identify as the airport lights tend to blend with the city lights. It is important to not only know the exact location of an airport relative to the city, but also to be able to identify these airports by the characteristics of their lighting patterns.

Aeronautical lights are designed and installed in a variety of colors and configurations, each having its own purpose. Although some lights are used only during low ceiling and visibility conditions, this discussion includes only the lights that are fundamental to visual flight rules (VFR) night operation.

It is recommended that prior to a night flight, and particularly a cross-country night flight, that a check of the availability and status of lighting systems at the destination airport is made. This information can be found on aeronautical charts and in the Chart Supplements. The status of each facility can be determined by reviewing pertinent Notices to Airmen (NOTAMs).

FAA- AC 70/7460-1M, CHG 1 - Obstruction Marking and Lighting

***4.3 Obstruction Lights in Urban Areas**.*

When a structure is located in an urban area where there are numerous other white lights (e.g., streetlights), red obstruction lights with appropriate marking or a medium-intensity dual system is recommended. White lighting is not normally recommended on structures less than 200 feet (60.96 m) or within 3 NM (5.56 km) of an airport.

6.8 Special Cases.

When lighting systems are installed on structures located near highways, waterways, airport approach areas, etc., caution should be exercised to ensure that the lights do not distract or otherwise cause a hazard to motorists, vessel operators, or pilots on an approach to an airport. In these cases, shielding may be necessary and should not derogate the lighting system's intended purpose.

6.0 Risk Assessment methodology

6.1 The risk assessment should primarily determine possible hazards near the aerodrome which may consist of disability glare or misleading patterns leading to confusion and then take appropriate action accordingly. The intensity of the glare is perceived by the pilot, and several factors could influence such as the point of observation, the height, angle of observation, exposure time to glare, wind screen conditions, colour of the light and its ambient conditions, phase of the aircraft (such as landing, take -off, short final approach) etc.

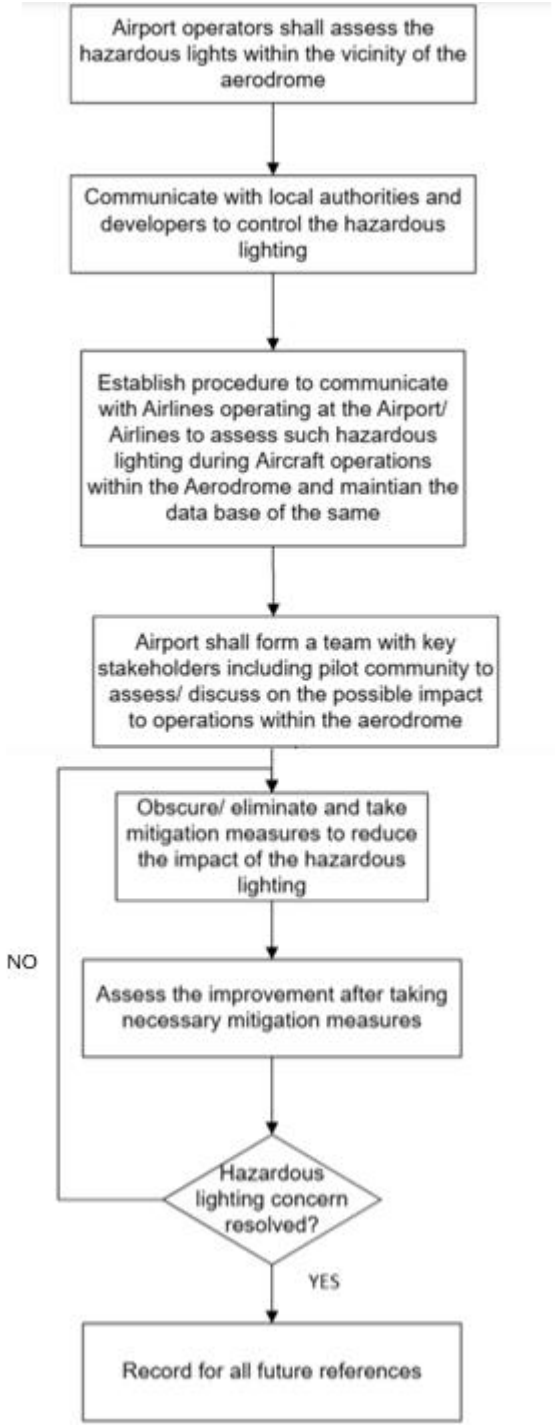
6.2 A well-established approach needs to be developed to assess the lights which are non-aeronautical and possible hazard. Airports need to communicate with local communities and development authorities to ensure the design aspect of ensuring the lights not glaring the Aircraft needs to be taken care of for the surrounding buildings/ high rise structures, stadiums, conventional halls etc., Also, Airport should form a group to monitor consistently the surrounding developments at a definite frequency and ensure the desired objectives are met in this context. This aspect can also be discussed in runway safety team or similar groups including all key stakeholders (Airlines/ pilot community, ANSP, Ground handling agencies, Airport operator etc.,) and should encourage to provide inputs on any possible lights glaring the pilots with the additional information requirement. Airports can maintain the data on the information and conduct real-time assessments and gather feedback and take necessary action appropriately.

6.3 The identified hazard such as a glaring light may be obscured or the intensity might be mitigated with action such as angular changes, using less intense lights etc., Feedback after the action taken is

very important and teams need to monitor the same at regular intervals. Typical flow chart has been prepared for the same and several case studies have been referred to have been included in the appendices.

6.4 For non-aeronautical ground lights which are hazardous and beyond the control of the aerodrome operator, the responsibility lies with the local authorities to oversight and managing such risk. Aerodrome operator may be involved in assisting with the identification of potential hazards and risk issues, including reporting such matters to the regulator (CAA) . The CAA should act as an intermediary in communicating risk issues and potential impacts to facilitate the implementation of appropriate risk mitigation measures.

RISK ASSESSMENT AND MITIGATION MEASURES FOR LIGHTS WITH THE HAZARDOUS EFFECTS



Appendix A

Case study: Bright Light Distraction on RWY 27R (North RWY) at Bangalore International Airport

Date of First Occurrence: May 31, 2023
Report Date: October 6, 2025

1. Introduction

This report consolidates multiple pilot observations and operational responses regarding bright light glare near Runway 27R (North Runway), which has been repeatedly reported as a visual distraction during aircraft approach and landing operations. The primary light source has been officially traced to the NHAI Toll Plaza at Chennahalli–Chenarayanapatnam (specifically, the Balepura Toll). The hazard has been confirmed to affect approaches to both RWY 27R and RWY 27L.

Google map

2. Incident Summary

Many separate flights arriving on the airport's parallel runways reported bright lights causing severe glare and visual disturbance during their final approach. One of the captains described the illuminated area as resembling a "ring road."

Flights Reporting Issue:

- I5 1569 (DEL–BLR): (ALDT): 00:33 Hrs (RWY 27R)
- 6E 373 (JAI–BLR): (ALDT): 01:29 Hrs (RWY 27R)
- 6E 1302: (RWY 27R)
- UK 807: (ALDT): (RWY 27R)
- 6E 1486: (ALDT): 03:45 Hrs (RWY 27R; Light Source identified at 2.9 NM from Threshold)
- 6E 7447: (ALDT): 22:47 Hrs (RWY 27L)
- UK 809 (A20N): (ALDT): 23:58 Hrs

3. Incident Timeline and Observations

May 31, 2023 (Initial Occurrence)

Initial complaints were received from I5 1569, 6E 373, and 6E 1302. Immediate coordination was established with Chanarayapatna Police and DM LSTM, who contacted Mr. Preetham (7024599557) of the NHAI Toll Team. Instructions were issued to direct all lights downward and switch off non-essential lights within the flight path.

June 4, 2023

Flight UK 807 reported a similar light glare issue. The site team promptly reached the location with police assistance and ensured the offending spotlight was turned off. Authorities were formally requested to implement permanent lighting modifications.

July 15, 2023

Flight 6E 1486 reported severe glare during approach. Immediate coordination with police was established, but upon arrival, no accountable NHAI employees were present. The team was unable to turn off the relevant MCB, as the control room was locked, preventing access.

July 21, 2023

A formal acknowledgement letter was submitted to the NHAI. The issue was discussed with the NHAI Project Director, who instructed their electrical team leader to prioritize resolution. The NHAI team leader has since requested time for a joint inspection.

July 22, 2023

At approximately 22:50 Hrs, flight 6E 7447 reported the glare on approach to Runway 27L. Landside security responded, but no responsible NHAI personnel were present to resolve the issue.

July 24, 2023

The Duty Safety Officer promptly visited the site and successfully engaged with NHAI officials. The airport team advised on several temporary mitigation measures, which the NHAI team acknowledged.

August 7, 2023

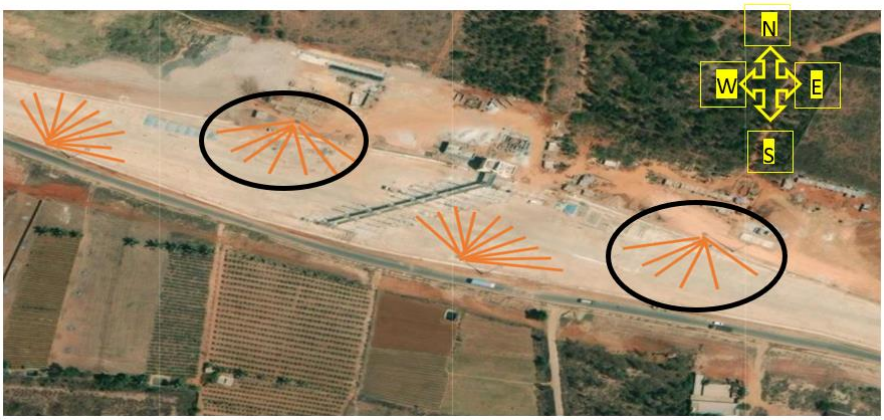
Flight UK 809 (A20N, ALDT: 23:58 Hrs) reported a white light having a glare effect after landing, confirming the persistence and recurrence of the hazard.

August 8, 2023

A joint inspection was conducted at the Balepura toll site by Mr. Ganesh (Airside Operations) with Mr. Uday Gowda, Mr. Mahesh Chandra (NHAI), and Mr. Abhay (Dilip Build Con, Electrical Engineer).

Key Observations:

- There are four high mast lights: two on the eastern side and two on the western side.
- The high masts that were previously not circled in the image have been lowered, along with their fixtures, to prevent light from focusing into the air.
- The circled high mast lights, previously non-operational, are now kept on due to the imminent commissioning and increased traffic at the toll, and these are the primary hazard source.
- The high mast lights that have not been lowered, along with their fixtures focusing into the air, are currently oriented towards the approach of Runway 27R.



4. Recommendations

The following mitigation measures were recommended to Mr. Uday Gowda, Mr. Mahesh Chandra of NHAI, and Mr. Abhay, the electrical engineer from Dilip Build Con: The following mitigation measures were recommended to Mr. Uday Gowda, Mr. Mahesh Chandra of NHAI, and Mr. Abhay, the electrical engineer from Dilip Build Con:

- To lower the height of the high mast to match the lowered height of the other lights.
- The lights' orientation should be adjusted to face downwards, minimizing any glare directed into the air.
- Regarding the possibility of providing shade to the lights to prevent glare towards the air, Mr. Abhay, the electrical engineer from Dilip Build Con, indicated that offering shade to the entire high mast might not be feasible. However, advised them to explore the option of making internal modifications to provide shade for individual lights within the mast if it's achievable.
- Instructed them to take the necessary actions by August 9th, 2023, as a follow-up inspection was scheduled. They acknowledged and accepted this timeline.

5. Immediate Actions Taken

- Coordinated with local police and NHAI for rapid site response and temporary mitigation on each occasion.
- Conducted a formal joint site inspection and provided on-site advisory for immediate corrective action.
- Briefed NHAI officials on the mandatory AAI NOC requirement (GSR 771E).
- Notified ATC regarding ongoing mitigation efforts.

6. Location Description (Balepura Toll Plaza)

The light source is the Balepura Toll Plaza, located near Chennahalli–Chenarayanapatnam.

Parameter	Detail
Coordinates	13 12 28.0195, 77 45 39.0052.
Surveyed Distance from RWY 27R Threshold	4253.7m(Approx).

Elevation (AMSL)	899.489 meters AMSL (As per survey conducted).
High Mast Top Elevation (AMSL)	929.489 meters AMSL (As per survey conducted).
High Mast Total Height	30 Meters.
CCZM Zone Classification	Red Zone (NOC mandatory from AAI)
Permissible Height at Site	960 meters AMSL.

7. Analysis

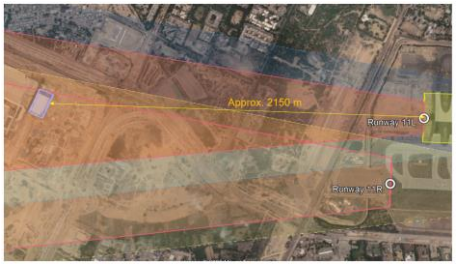
The recurrence of light glare incidents, now affecting multiple flights over three months and confirmed on two separate runways, highlights the extreme urgency of the situation. The inspection on August 8th confirmed that specific, un-lowered high masts, which are now operational, are directed toward the approach path. This confirms the hazard source and operational failure. The site's classification as a Red Zone (NOC mandatory) under the Colour Coded Zoning Map (CCZM) and the continued non-compliance with height regulations (GSR 771E) elevate this from an operational issue to a serious regulatory violation and an unacceptable safety hazard.

Appendix B

Report on LED Façade Glare Issue at IICC Dwarka

1. Background

- On **18 August 2020**, IICC requested approval from DIAL for installing highly reflective mirror-finish ACP cladding on the exterior façade of the Convention Centre Building at IICC, Dwarka.
- DIAL granted clearance based on the reverberation assessment/study submitted by IICC, with the condition that any glare complaints from aircraft after installation must be addressed urgently by IICC.



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2. Incident

- On **17 March 2023 at 19:17 hrs**, ATC reported that a bright red LED screen on the new convention centre near Runway 11R was causing dazzling effects, and pilots were complaining.
- The nearest edge of the façade is located approximately **2,150 meters from Runway 11L threshold**, with LED panels installed on all four sides of the building.

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3. Immediate Actions

1. **17 March 2023:** DIAL Operations team visited the site and ensured the LED lights were switched off immediately to mitigate the safety hazard.
2. **20 March 2023:** Official correspondence sent to Project Director, IICC, and copies marked to DGCA, AAI, SDMC, and Delhi Police.
3. **20 March 2023:** Email from Airside Planning to IICC directing immediate switch-off of LED screens to ensure aircraft safety.
4. **20 March 2023:** Meeting convened with DIAL and L&T (IICC project team) officials:
    - IICC informed that the project is under the Ministry of Commerce & Industry.
    - DIAL advised IICC to seek DGCA permission before switching lights on again.
    - IICC agreed to keep LEDs switched off during twilight/night until clearance.

4. Regulatory Reference

- **Rule 66.C of The Aircraft Rules, 1937**:
  - Prohibits lights near aerodromes that, due to glare, endanger aircraft safety.
  - Provides authority for extinguishing or screening such lights if necessary.

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5. Further Developments

- **4 Sep 2023:** NSIDC (IICC developer) requested DGCA permission to operate LED display.
- **5 Sep 2023:** DGCA sought DIAL's comments.
- **6 Sep 2023:** DIAL responded:
  - Building lies in approach funnel of Runways 11R & 11L (~2.3 km from runway end).
  - LED glare poses serious safety hazard.
  - Recommended glare analysis and intensity limits.
- **8 Sep 2023:** DGCA meeting decided NICDC to conduct glare analysis.
- **13 Sep 2023:** NSIDC submitted Glare Hazard Analysis Report.
- **15 Sep 2023:** DGCA granted conditional permission:
  - Operate LED façade at **≤80% brightness in daylight** and **≤40% brightness at night/twilight**.
  - NSIDC to formulate SOP; DIAL to monitor and report pilot feedback.
- **20 Nov 2023:** IICC shared SOP with DGCA and DIAL.
- **10 May 2024:** DIAL team visited IICC control room to review luminosity control software.

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6. Current Status

- LED façade operation permitted under DGCA conditions:
  - Brightness limits: **80% (day)**, **40% (night/twilight)**.
  - SOP implemented by IICC.
- DIAL monitors pilot reports and ensures compliance with DGCA directives.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

ASIA PACIFIC REGIONAL GUIDANCE ON STRENGTH ASSESSMENT AND CLASSIFICATION OF UNPAVED AND GRASSED RUNWAYS

[FINAL DRAFT]

VERSION 1.0 – DECEMBER 2025

This guidance material was developed by the Asia Pacific Aerodrome Design and Operation Task Force (AP-ADO/TF).

It was approved by AOP/SG/(DD – MM 20xx) and published by ICAO Asia and Pacific Office, Bangkok.

ICAO Standards and Recommended Practices (SARPs), Procedures for Air Navigation Services and Manuals shall take prevalence in the event of any conflict between the aforementioned provisions and this guidance material.

Comments on this guidance material may be sent to ICAO Asia and Pacific Office at apac@icao.int.

RECORD OF AMENDMENTS

AMENDMENTS				AMENDMENTS			
No	Date applicable	Date entered	Entered by	No	Date applicable	Date entered	Entered by

Table of Contents

1. FOREWORD

1.1 Introduction

1.1.1 At the Seventh Meeting of Aerodrome Operations and Planning Sub-group (AOP/SG/7) held in Bangkok on 3 – 6 July 2023 New Zealand presented a paper regarding the strength assessment guidance for unpaved runways in New Zealand and the challenges of promulgating a strength classification for a grass runway. The paper highlighted a lack of ICAO guidance on strength assessment for unpaved runways and invited the meeting to consider the need for the establishment of recommended practices regarding unpaved runways. AOP/SG/7 agreed to assign this special task to the Asia Pacific Aerodrome Design and Operation Task Force (AP-ADO/TF).

1.1.2 The Fifth Meeting of the Asia Pacific Aerodrome Design and Operation Task Force (AP-ADO/TF/5) recognised the importance of assessment and classifying the strength of unpaved and grassed runway surfaces. AP-ADO/TF/5 endorsed the decision to form a Small Working Group (SWG) comprised of Australia, Nepal and Papua New Guinea to develop a *Guidance on Strength Assessment and Classification of Unpaved and Grassed Runway* for use as a reference document in Asia Pacific Region.

1.1.3 This guidance was developed using information derived from ICAO Annex 14 Volume I – Aerodrome Design and Operations, Aerodrome Design Manual (Doc 9157) Part 3 — Pavements, CASA Australia AC139.C-07 Strength Rating of Aerodrome Pavements.

1.1.4 This guidance should be read in conjunction with Chapter 3 of Annex 14, Volume I. It is expected that these requirements should be complied with for unpaved surfaces wherever practicable.

1.2 Background

1.2.1 Some elements of the movement area at an aerodrome may not be paved but must still be capable of supporting aircraft operations. The natural ground in these instances may not have sufficient bearing strength to handle the aircraft, and therefore a strength assessment of this surface may be necessary. Adequate strength is required in order to ensure that no structural damage is sustained by an aircraft using or otherwise veering off onto the unpaved surface. The unpaved surface must also be capable of supporting any ground vehicles that may occasionally operate on the area.

1.2.2 The guidance provided in this section is geared toward the physical attributes most commonly left unpaved at an aerodrome. Specifically, these are runway and taxiway shoulders, Runway End Safety Area (RESA) and runway strips outside the runway shoulder area.

1.2.3 For any unpaved surface, the ingestion or jet blast of foreign object debris by aircraft turbine engines is an important consideration. The protection of the surface to ensure no loose material is allowed is the responsibility of the aerodrome. Some type of chemical treatment or the use of turf may be required for the unpaved surface, along with visual inspections, to ensure that foreign object debris is not present.

1.2.4 Any bearing strength-related guidance provided in this document should not be interpreted as a prescriptive design requirement. Such guidance is provided to support the judgment of the assessing personnel when no specific data is available.

1.3 Purpose and Scope

1.3.1 This document provides guidance on the strength assessment and classification of unpaved and grassed runways intended for light aircraft of mass equal to or less than 5 700 kg.

2. DEFINITIONS, ACRONYMS AND ABBREVIATIONS

2.1 Definitions

When the following terms are used in this document they have the following definitions:

Aircraft Classification Rating (ACR). A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

California Bearing Ratio (CBR). The bearing ratio of soil determined by comparing the penetration load of the soil to that of a standard material. The method covers evaluation of the relative quality of subgrade soils but is applicable to sub-base and some base course materials.

Natural Surface. Undisturbed ground surface before excavation or construction.

Pavement Classification Rating (PCR). A number expressing the bearing strength of a pavement.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Subgrade. The upper part of the soil, natural or constructed, which supports the loads transmitted by the pavement, also referred as the formation foundation.

Unpaved Surface. A surface, intended for aircraft operations, composed of unbound or natural materials. Unpaved surfaces may include gravel, coral, sand, clay, hard packed soil mixtures, grass, turf or sod.

Unprepared Surface. Any naturally occurring surface used as a runway that has not been altered by man.

Using Aircraft. An unpaved surface satisfactorily supporting aircraft using it, can accept other aircraft if they are no more demanding than the using aircraft.

2.2 Acronyms and Abbreviations

When the following Acronyms and Abbreviations are used in this document, they have the following meanings:

ACR: Aircraft Classification Rating

AFM: Aircraft Flight Manual

AIP: Aeronautical Information Publication

CBR: California Bearing Ratio

NOTAM: Notice to Airmen

PCR: Pavement Classification Rating

POH: Pilots Operating Handbook

RESA: Runway End Safety Area

RTF: Radiotelephony

3. CLASSIFICATION OF RUNWAY SURFACE TYPE

3.1.1 The description of the type of runway surface is required to be reported for use by pilots to correct the effective operational length.

3.1.2 The following is a list of the standard terminology for use in describing an unpaved runway surface. Only one term should be used when reporting the description of an unpaved runway surface:

Table 3.1 – Types of Runway Surfaces

Surfaces	**Abbreviation**	**Note**
Coral	CR	
Firm Grass	GR(f)	
Grass	Gr/GRASS	
Gravel	GRVL	
Gravel (stabilised)	GRVL(st)	
Primed gravel	PRIME	Bitumen, oil or tar bound pavements with no stone cover.
Natural Ground Surface	NS	undisturbed ground surface before excavation or construction
Sand	SA	
Soft Grass	GR(s)	
Snow and compacted snow	SN	

Figure 3.1 – Grass

Figure 3.2 – Firm grass

4. ASSESSMENT OF BEARING CAPABILITY OF UNPAVED AND GRASSED RUNWAY

4.1 Strength of runways

4.1.1 Annex 14 Volume I, paragraph 3.1.21 recommends that the runway should be capable of withstanding the traffic of aeroplanes the runway is intended to serve.

4.1.2 The following subsections provide three methods which may be applied to an unpaved runway surface. It is up to the responsible Civil Aviation Authority or aerodrome operator to determine which method, or an alternative means, is most suitable for the intended operation.

4.2 Using aircraft experience (intended aircraft)

4.2.1 This method relies upon the operational experience of aircraft utilizing an existing runway surface.

Figure 4.1 – Using aircraft experience relies on aircraft utilizing the runway

4.2.2 This method is very simple to use however the limitations below need to be understood first before it is applied.

4.2.3 This method is not recommended for aircraft with an apron (ramp) mass greater than 5 700 kg. In these cases, a technical evaluation should be used to more accurately define the bearing strength properties of the surface. Refer to subsection 4.4.

4.2.4 This method also relies upon previous experience which may not be reflective of future performance. For example, an existing aircraft type may have successfully used an unpaved surface however its strength may have been compromised through repeated use. Environmental conditions, the absorption of water, temperature variability, soil reactivity and other factors such as any depression, distress and undulation of the surface could make a previously suitable surface no longer serviceable for the intended operation.

4.2.5 Aircraft factors, including its mass, tyre pressure, braking application and take-off/landing speeds can also impact upon the performance of the unpaved runway surface and need to be considered.

4.2.6 To mitigate against this potential hazard, regular inspections of the surface should be undertaken. Refer to subsection 5.1.

4.2.7 To use this method:

4.2.7.1 **Step 1:** Select the intended aircraft type based upon the desired or expected use of the existing unpaved runway surface.

4.2.7.2 **Step 2:** Obtain the maximum take-off mass and tyre pressure(s) for the selected aircraft. This information can generally be located from the Pilots Operating Handbook (POH), the Aircraft Flight Manual (AFM) or officially published technical data from the aircraft manufacturer.

4.2.7.3 **Step 3:** Publish these technical parameters for the unpaved runway surface in Aeronautical Information Publication (AIP) or another suitable document.

4.2.7.4 This method can also be used in conjunction with the vehicle-based method, or other evaluative or empirical methods.

4.3 Vehicle-based method

4.3.1 An aircraft can land anywhere between the provided runway or runway strip surface markers (if provided), not necessarily along the centreline. If the aircraft encounters a surface soft spot at high speed, it may lose directional control or a wheel assembly may be torn off, resulting a roll or nose over. The vehicle-based assessment method for indicating the bearing capability of a runway surface involves the simulation of impact an aircraft may cause to the runway surface by using a test vehicle of correlating weight as shown in the table below.

Table 4.1 – Aircraft / Vehicle Weight Correlation

Type of aircraft	**Test vehicle**
Light single or twin aircraft (i.e., Beechcraft 36, Piper 28, or Cessna 172, 182, 206, 210, etc.	Light laden 3 tonne truck with repetitive passes in wet areas
Medium single or twin such as Aero Commander, Beechcraft Baron, Kingair, De Havilland Canada DHC-6 Twin Otter, Dornier 228, L 410, Cessna Caravan 208, 421, Daher Kodiak 100 or 900, etc.	Fully laden 3 tonne truck with repetitive passes in wet and moist areas associated with your experience of aircraft using the aerodrome
Heavier aircraft such as F27, Caribou, DC3 etc.	Fully laden 5 tonne truck with repetitive passes in wet and moist areas

4.3.2 A test vehicle as indicated should be driven in a zigzag pattern at a speed not exceeding 15 km/hr for the full length and width of the runway. Particular attention should be paid to suspect areas with possibly three passes of the test vehicle over these areas.

Figure 4.2 – Uneven runway surface

4.3.3 If tyre imprints exceed a depth of 25 mm, the surface is not suitable for aircraft operations particular to the test vehicle. Unnecessary disruption of the surface is to be avoided because such impacts such as tyre imprints are hard to remove when the surface has dried out. In some instances, the surface may be unsafe with a lesser imprint, and this is at the discretion of the assessing personnel.

4.3.4 Remember, that the above test may leave wheel ruts, which will need to be filled in later before the runway can be reopened for aircraft movement.

Figure 4.3 – Unserviceable runway due to hardened tyre imprints

4.3.5 Because the 5 700 kg limit for light aircraft represents pavement loads only two-thirds or less of common highway loads, the assessment of traffic using pavements should extend to consideration of heavy ground vehicles, such as fuel trucks, fire trucks, snow ploughs, service vehicles, etc. These must also be controlled in relation to load limited pavements *(Doc 9157 Aerodrome Design Part 3 – Pavements, Third Edition 2022, clause 3.5.12).*

4.3.6 To test for slippery condition, any 4-wheel drive vehicle may be used, but it is necessary to use the same or similar vehicle throughout the test. During dry conditions the vehicle is driven over the runway at 50 km/hr and the brakes applied to lock all four wheels. The length of skid is measured and recorded. During wet conditions the operation is repeated and the length of skid measured. If this dimension exceeds 1.5 times the recorded dry skid distance the surface is considered to be unacceptably slippery.

4.3.7 The test for rough surface condition is to drive a stiffly sprung vehicle such as a Land Rover, without discomfort to the passengers, at a speed not less than 75 km/hr for the central 30 m, and not less than 50 km/hr for the remainder of the runway strip.

4.3.8 The maximum allowable width of cracks and size of stones permitted is 25 mm within the central 30 m and 50 mm for the remainder. If there is a soft wet condition within the runway strip area, the entire direction must be closed if it is unacceptably rough.

4.4 Empirical method

Paved surfaces

4.4.1 The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg shall be made available by reporting the following information *(Annex 14, Volume I, 2.6.8)*:

a) maximum allowable aircraft mass; and

b) maximum allowable tire pressure.

Example: 4 000 kg/0.50 MPa

4.4.2 Light aircraft are those having a mass of 5 700 kg or less. These aircraft have pavement requirements less than that of many highway trucks. Technical evaluations of those pavements can be made but an evaluation based on "using aircraft" is satisfactory. It is worth noting that, at some airports, service vehicles such as fire trucks, fuel trucks or snow ploughs may be more critical than aircraft. Since nearly all light aircraft have single-wheel undercarriage legs, there is no need for reporting subgrade categories. However, since some helicopters and military trainer aircraft within this mass range have quite high tire pressures, limited quality pavements may need to have tire pressure limits established *(Doc 9157 Aerodrome Design Part 3 – Pavements, Third Edition 2022, clause 3.3.6).*

4.4.3 In evaluating pavements meant for light aircraft — 5 700 kg mass and less — it is unnecessary to consider the geometry of the undercarriage of aircraft or how the aircraft load is distributed among the wheels. Thus, subgrade class and pavement type need not be reported, and only the maximum allowable aircraft mass and maximum allowable tire pressure need to be determined and reported. For these, the foregoing guidance on techniques for "using aircraft" evaluation should be followed *(Doc 9157 Aerodrome Design Part 3 – Pavements, Third Edition 2022, clause 3.5.11).*

Unpaved surfaces

4.4.4 Due to the nature of unpaved surfaces, an empirical method for assessing the bearing capability has inherent limitations. An unpaved or natural surface may not have a consistent bearing capability across the entire surface; therefore, consideration should be made for developing a process that considers the capability of the surface so far as reasonably practicable. Additionally, prevailing weather conditions may significantly affect the capability of the runway.

Figure 4.3 – Unserviceable runway due to melting snow

4.4.5 One example of a bearing capability assessment is the use of a Dynamic Cone Penetrometer which can generate a strength estimate of the surface.

4.4.6 An aerodrome operator should develop an assessment process that includes sufficient measurements to develop an appreciation of the capability of the entirety of the unpaved runway and the associated surfaces that should be load-bearing.

4.4.7 An aerodrome operator should engage with aircraft operators to ensure aircraft operators understand the capability data of the runway, and the conditions in which the measurements were taken. With the assistance of subject-matter experts, aircraft operators should consider the criteria under which the runway has been determined usable for a design aircraft.

5. INSPECTION AND REPORTING PROCESS

5.1 Inspections of unpaved surfaces

5.1.1 Inspections of the movement area should be planned to ensure that an appropriate level of vigilance is maintained at all times.

5.1.2 The inspection of unpaved surfaces should cover, at a minimum, the following items:

a) the runway;

b) the remaining manoeuvring area, including taxiways and adjacent areas; and

c) the apron and service areas as applicable.

Figure 5.1 – Uncompacted gravel runway with loose stones

5.1.3 During the inspection, particular attention should be given to:

a) surface conditions including signs of damage or distress;

b) detection of FOD or other surface contamination;

c) detection of surface depressions, rutting or undulation;

d) detection of areas with a weaker surface strength including mud, sinkholes, standing water, erosion, etc.;

e) The general condition of the surface grass/vegetation, particularly any areas of blast. Rotor wash or prop wash erosion; and

f) the grass length including any weed growth.

5.1.4 Ideally, a first inspection should be conducted prior to daily operations. Subsequent inspections should also be undertaken in the event of:

a) significant precipitation or snow;

b) high winds;

c) heavy rain;

d) extreme or seasonally uncommon weather event; and

e) abnormal (i.e., heavy) landing.

5.1.5 A log should be kept recording the results of the inspection.

5.2 Reporting of unpaved surface condition

5.2.1 If a dangerous or otherwise hazardous unserviceability is discovered during an inspection it should be immediately reported.

5.2.2 If a NOTAM service is available at the aerodrome, it should be used to advise aircraft operators and other stakeholders of the change to aerodrome condition or capability.

5.2.3 If a radiotelephony (RTF) service is available and the reporter is sufficiently qualified and experienced to use such equipment, the provision of advice via RTF to any arriving or departing aircraft should be considered.

5.2.4 The entity in charge of aerodrome operations should also be informed.

5.2.5 Consideration should also be given to updating any published information, such as in AIP or other operational documents.

6. RISK MITIGATION

6.1.1 If there is any doubt as to the serviceability of an unpaved runway surface, appropriate mitigation options should be immediately considered to protect aircraft operations.

6.1.2 This may include but not be limited to the following:

a) The affected runway, taxiway and/or apron should be restricted or closed to aircraft operations until the conditions improve.

b) Visual aids in the form of unserviceability markers should be used to alert pilots of the restricted or closed portion of the movement areas.

c) If the unpaved surface is available for nighttime operations, any lighted visual aids should be extinguished or covered so that they are no longer visible.

d) Vehicles and person should avoid driving on the unserviceable areas as they may become stranded or may exacerbate the surface condition.

Figure 6.1 – Unpaved runway well graded and compacted

6.1.3 Once the conditions return to a serviceable state, the closed or restricted areas can be returned to service, visual aids removed/reinstated and appropriate reports made as to the aerodrome condition.

REFERENCES

1) ICAO Annex 14, Volume I

2) PANS-Aerodromes (Doc 9981)

3) Aerodrome Design Manul Part 3 – Pavement (Doc 9157)

4) CASA Australia AC139.C-07V1.0 Strength Rating of Aerodrome Pavements

5) New Zealand AC139-6 Aerodrome Design Requirements – All aeroplanes above 5700kg MCTOW, Sections 2.5 & 2.6

6) Transport Canada Advisory Circular (AC) No. 300-004: Unpaved Runway Surfaces

TERMS OF REFERENCE
ASIA/PACIFIC AERODROME DESIGN AND OPERATIONS ~~TASK FORCE~~ WORKING GROUP (AP-ADO/~~TF~~WG) (Proposal for ~~Amendment to AP-ADO/TF's~~ changing the name of Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF) to Asia/Pacific Aerodrome Design and Operations Working Group (AP-ADO/WG) and subsequent amendment to its Terms of Reference (TOR))

Objective:

The main purpose of the ~~AP-ADO/TF~~ AP-ADO/WG is to achieve some specific deliverables of the AOP/SG through the systematic work of the ~~Task Force~~ Working Group.

Scope of works:
To meet the above objective the ~~AP-ADO/TF~~ AP-ADO/WG shall carry out the following tasks:

(1) **Study and discuss** aerodrome SARPs and guidance materials related to aerodrome planning, design and operations including PANS-Aerodromes and provide expert advice and clarification to APAC States on any issues related to the implementation of the requirement specified in the SARPs and guidance materials.

(2) **Review and discuss** AOP parts of the Global Air Navigation Plan (GANP), the Asia/Pacific ANP and Seamless ANS Plan and formulate amendment proposals to the APAC ANP Table AOP I-1 and Table AOP II-1 as necessary.

(3) **Review** provisions of facilities and services at international aerodromes specified in AOP Table of ANP through monitoring the following information published in the AIP and other official documents of the States:

- ~~Upcoming new~~ New concept of obstacle limitation surfaces;
- ~~v~~Visual aids;
- ~~r~~Rescue and firefighting services and emergency planning;
- ~~a~~Assessment and reporting of the runway surface condition;
- ~~p~~Preventive maintenance programme;
- ~~r~~Runway safety programme including establishment of a runway safety team at international aerodromes;
- SMGCS & A-SMGCS;
- Pavement ~~S~~strength reporting (ACR/PCR); and
- Heliport design and operations

(4) **Review and discuss** Airport Operations Plan (AOP), Airport Operations Centre (APOC) and Total Airport Management (TAM) provisions of GANP;

(5) **Assist in conducting** seminars/workshops/trainings for the aerodrome regulatory and aerodrome operator staff in APAC Region;

(6) **Identify** experts in various AOP fields and **maintain** Asia/Pacific database;

(7) **Participate** in ICAO's activities/initiatives in aerodromes, if necessary.

Composition: The ~~Task Force~~ Working Group is composed of subject matter experts nominated by APAC States/Administrations and International Organization satisfying the criteria:

(1) Minimum 3 years of experience in Aerodrome Regulatory functions of CAA or in Aerodrome Operations at international airports or in the International Organizations;

(2) Familiar with Annex 14, PANS-Aerodromes (Doc 9981) and its guidance materials, GANP, GASP, APAC Seamless ANS Plan, APAC ANP; and
(3) The nominated expert would continue to be a member for a minimum of three consecutive years.

Additional membership could be invited from other Regions, if required.

Working Methods: The ~~Task force~~ Working Group will hold at least one face-to-face meeting a year. Video teleconference may be held in lieu of face-to-face meeting when travel restrictions are in place. The work would be carried out through electronic correspondences and web conference as far as practicable.

Time frame: The tenure of the ~~Task Force~~ Working Group would last until ~~September 2026~~ it is dissolved by the AOP/SG.

Asia/Pacific Aerodrome Assistance Working Group (AP-AA/WG)

TERMS OF REFERENCE
(Proposal for Amendment to AP-AA/WG's TOR)

Objective:

The main objective of the establishment of AP-AA/WG is to realize the commitment of the "Beijing Declaration" - to certify all aerodromes used for international operations by 2020, support the certification of heliports used for international operations, fulfil the objectives of the AOP/SG to address identified AOP deficiencies listed in APANPIRG database for their resolution and to improve the AGA EI resulting from USOAP CMA activities and meet Global Aviation Safety Plan ~~2023—2025~~ targets.

Scope of works:

To meet the above objective the AP-AA/WG shall carry out the following tasks:

(1) **Conduct** a survey on States which have not completed the implementation of aerodrome certification for all international aerodromes, with an AGA EI below 75%, and/or AOP air navigation deficiencies to establish the requirements for assistance;

(2) **Review** the air navigation deficiencies in the field of AOP (as listed in the APANPIRG air navigation deficiencies database) and assist the concerned State(s) to develop corrective action plans;

(3) **Assist** States which have not implemented aerodrome certification, with non-satisfactory aerodrome certification related PQs, and/or aerodrome certification related air navigation deficiencies to establish an aerodrome certification process including developing specific operating regulations, training programme and training plan, guidance material for all technical areas, aerodrome inspector handbook with checklists, procedures for accepting non-compliances, ~~and~~ surveillance programme, safety oversight of ground handling, establishing runway safety programme, and implementation of Global Reporting Format (GRF) using existing platforms, such as COSCAPs, PASO and introducing a new methodology, such as, Asia Pacific Aerodrome Assistance Go-Team;

(4) **Assist** States which have not implemented heliport certification to establish a heliport certification process, including developing specific operating regulations, training programme and training plan, guidance material for all technical areas, heliport inspector handbook with checklists, procedures for accepting non-compliances, and surveillance programme;

(5) **Assist** in conducting seminars/workshops/trainings for the aerodrome regulatory and aerodrome operator staff in APAC region; provide experts to deliver presentations at the seminars/workshops in aerodrome and heliport certification, implementation of Safety Management System (SMS) and other technical areas such as aerodrome emergency planning, runway safety, ground handling, etc.; and

(6) **Maintain** the register of AGA Experts nominated by States and Industry Partners in accordance with *Conclusion APANPIRG/33/3 - Assistance to APAC States that require assistance in AGA area including certification and surveillance of aerodromes*.

Composition: The AP-AA/WG would be composed of subject matter experts nominated by APAC States/Administrations and International Organizations, familiar with Annex 14, PANS-Aerodromes

(Doc 9981) and its guidance materials and in particular on aerodrome certification procedures and ICAO USOAP CMA.

Working Methods: As far as practicable, the work should be carried out through electronic correspondences and web-conferences. The Working Group will hold at least one face-to-face meeting a year. The AP-AA/WG may be assembled on need basis to assist States. On-site assistance may be provided to States, if required, on cost-recovery basis through Asia Pacific Aerodrome Assistance Go-Team platform. The ICAO APAC Office would do necessary coordination. The ICAO COSCAPs will support the implementation of Tasks.

Time frame: The tenure of the AP-AA/WG would last until ~~September 2026~~ it is dissolved by the AOP/SG.

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TERMS OF REFERENCE OF
WILDLIFE HAZARD MANAGEMENT WORKING GROUP (WHM/WG)
(Proposal for amendment to AP-WHM/WG's TOR)

Objective:
To assist States/Administrations to establish a National Wildlife Hazard Management Committee and Wildlife Hazard Management Programme.

Scope of works:

To meet the above objectives the Working Group shall carry out the following tasks:

1) Develop a model TOR for National Wildlife Hazard Management Committee (NWHMC);
2) Monitor the establishment of a National Wildlife Hazard Management Committee by the States~~.~~;
3) Assist in conducting workshop/seminar on Global and Regional Guidance on WHM;
4) Develop Asia Pacific Regional Guidance on Wildlife Hazard Management Programme, as needed;
5) Share the best practices on the measures adopted by member States/Administrations to prevent wildlife strike hazards at or in the vicinity of aerodromes;
6) Develop ~~a~~ performance measurement metrics to evaluate the effectiveness of the implementation of the Wildlife Hazard Management Programme; ~~and~~
7) Be consistent with ICAO Annex 14, Volume I – Aerodrome Design and Operations, PANS-Aerodromes (Doc 9981), ~~Doc 9137~~ Airport Services Manual (Doc 9137), Part 3 – Wildlife Hazard Management, ICAO Bird Strike Information System (Doc 9332) and other requirements where applicable~~.~~;
8) Analysis of the regional problems/issues in wildlife hazard management fields~~.~~;
9) Support States/Administrations with limited resources (human and financial) to enhance their capacity in Wildlife Hazard Management through workshops and technical assistance, such as, ICAO Asia/Pacific WHM Go-Team Mission, as needed;
10) Monitor and assist States/Administrations in the establishment and implementation of National Wildlife Hazard Management Programme; and
11) Maintain the register of WHM Experts nominated by States and Industry Partners.

Composition:

The Working Group would be composed of subject matter experts nominated by APAC States–/ Administrations and International Organization satisfying the criteria:

(1) Minimum 3 years of work experience in CAA Aerodrome Regulatory Department or NWHMC or in International Organizations or Aerodrome Operations at international airports in wildlife hazard management field;

(2) Familiar with Annex 14 and related guidance materials (PANS-Aerodromes (Doc 9981); Airport Services Manual (Doc 9137), Part 3 – Wildlife Hazard Management, ICAO Bird Strike Information System (Doc 9332); and

(3) The nominated expert will continue to be a member for a minimum of three consecutive years.

States/Administrations in other ICAO regions and industry partners with experience in wildlife hazard management may also be invited to participate in the Working Group.

Conduct of the work:

As far as practicable, the work would be carried out through electronic correspondences and web-conferences. The Working Group will hold at least one face-to-face meeting a year. Onsite assistance may be provided to States, if required, on cost-recovery basis through ICAO Asia/Pacific WHM Go-Team missions. The ICAO APAC Office would do necessary coordination. The ICAO COSCAPs will support the implementation of Tasks.

Time frame:

~~The Working Group would complete its work by September 2026.~~ The tenure of the AP-WHM/WG would last until it is dissolved by the AOP/SG.

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Aerodromes in APAC Region used for International Operations and yet to be certified

S. No	Sub-region	State / Admin	ICAO Code	Name of City	Name of Aerodrome
1	SA	Afghanistan	OAHR	Herat	Herat Intl
2	SA	Afghanistan	OAKB	Kabul	Kabul Intl
3	SA	Afghanistan	OAKN	Kandahar	Kandahar Intl
4	SA	Afghanistan	OAMS	Mazar-e-Sharif	Mazar-e-Sharif
5	NA	China	RCYU	Hualien	Hualien
6	NA	China	RCMQ	Taichung	Cingcyuangang
7	NA	China	RCNN	Tainan	Tainan
8	SA	India	VICG	Chandigarh	Shaheed Bhagat Singh Intl
9	SA	India	VOGO	Goa	Dabolim
10	SA	India	VEGK	GORAKHPUR	Mahayogi Gorakhnath
11	SA	India	VIDX	HINDAN	Hindon
12	SA	India	VIJO	JODHPUR	Jodhpur
13	SA	India	VOPB	Port Blair	Veer Savarkar Intl
14	SA	India	VAPO	Pune	Jagadguru Sant Tukaram Maharaj
15	SA	India	VISR	Srinagar	Srinagar
16	SA	India	VOVZ	VISAKHAPATAN	Visakhapatnam Intl
17	PAC	Kiribati	PLCH	Kiritimati	Christmas I.
18	PAC	Kiribati	NGTA	Tarawa	Bonriki Intl
19	SEA	Lao PDR	VLLB	Luangprabang	Luangprabang Intl
20	SEA	Lao PDR	VLSK	Kaisonphimvihan	Savannakhet Intl
21	SEA	Lao PDR	VLPS	Pakse	Pakse Intl
22	PAC	Micronesia	PTPN	Pohnpei I.	Pohnpei Intl
23	PAC	Micronesia	PTKK	Weno I.	FM Chuuk Intl
24	PAC	Micronesia	PTYA	Yap I.	Yap Intl
25	PAC	Micronesia	PTSA	Kosrae I.	Kosrae
26	PAC	Nauru	ANYN	Nauru I.	Nauru intl
27	SEA	Timor Leste	WPDB	Suai	Commander-in-Chief of the FALINTIL – Kay Rala Xanana Gusmão Intl
28	SEA	Timor Leste	WPOC	Oe-Cusse	Rota de Sândalo International
29	PAC	Tuvalu	NGFU	Funafuti	Funafuti Intl

Airports with temporary aerodrome certificates

S. No	Sub-region	State / Admin	ICAO Code	Name of City	Name of Aerodrome
1	SEA	Philippines	RPVK	Kalibo, Aklan	Kalibo Intl*
2	SEA	Philippines	RPVP	Puerto Princesa City	Puerto Princesa Intl*
3	SEA	Philippines	RPSP	Panglao	Bohol-Panglao Intl*

* Airports granted with temporary aerodrome certificates

S. No.	State's USOAP EI in AGA Area (Date: 11 April 2026) Source: iSTARS 4.0, USOAP DATA TABLE			
	State	USOAP EI (In Per Cent)		Remark
1	Afghanistan	16.13	Less than or equal to 60%	02-16/12/2019, Documentation-base Audit
2	Australia	87.18	More than or equal to 75%	12-19/09/2023, Focus Audit
3	Bangladesh	64.22	More than 60% to less than 75%	19-27/09/2017, ICVM
4	Bhutan	77.88	More than or equal to 75%	7-16/08/2018, ICVM
5	Brunei	80.17	More than or equal to 75%	17/02-01/03/2007, CMA Audit
6	Cambodia	71.67	More than 60% to less than 75%	4-12/6/2025, ICVM
7	China	94.53	More than or equal to 75%	16-30/04/2024, CMA Audit
8	Cook Islands		Less than or equal to 60%	Nil AGA Activity
9	DPR Korea	84.25	More than or equal to 75%	26/05-04/06/2008, CMA Audit
10	Fiji	76.15	More than or equal to 75%	27/08-04/09/2019, ICVM
11	India	92.68	More than or equal to 75%	09-16/11/2022, ICVM
12	Indonesia	69.23	More than 60% to less than 75%	10-18/10/2017, ICVM
13	Japan	92.17	More than or equal to 75%	14-23/06/2010, CMA Audit
14	Kiribati		Less than or equal to 60%	Nil USOAP Activity
15	Lao PDR	74.77	More than 60% to less than 75%	21-27/04/2015, ICVM
16	Malaysia	47.90	Less than or equal to 60%	29/09-30/10/2020, Off-site Validation Activity
17	Maldives	90.16	More than or equal to 75%	11-23/6/2025, CMA Audit
18	Marshall Islands	9.26	Less than or equal to 60%	25-28/05/2010, CMA Audit
19	Micronesia	0.93	Less than or equal to 60%	13-17/12/2010, CMA Audit
20	Mongolia	88.07	More than or equal to 75%	28/06-07/07/2010, CMA Audit
21	Myanmar	62.83	More than 60% to less than 75%	100-21/12/2018, CMA Audit
22	Nauru	5.71	Less than or equal to 60%	03-03/03/2008, CMA Audit
23	Nepal	67.48	More than 60% to less than 75%	13-25/04/2022, CMA Audit
24	New Zealand	72.66	More than 60% to less than 75%	9-22/7/2025, CMA Audit
25	Pakistan	80.00	More than or equal to 75%	05-12/06/2024, ICVM
26	Palau	7.41	Less than or equal to 60%	22-26/11/2010, CMA Audit
27	Papua New Guinea	74.19	More than 60% to less than 75%	9-16/4/2025, ICVM

S. No.	State's USOAP EI in AGA Area (Date: 11 April 2026) Source: iSTARS 4.0, USOAP DATA TABLE			
	State	USOAP EI (In Per Cent)		Remark
28	Philippines	45.37	Less than or equal to 60%	30/05/08/06/2017, ICVM
29	Rep. of Korea	98.25	More than or equal to 75%	13-22/05/2008, CMA Audit
30	Samoa	58.18	Less than or equal to 60%	11-16/02/2010, CMA Audit
31	Singapore	100.00	More than or equal to 75%	16-19/11/2021Virtual ICVM
32	Solomon Islands	14.42	Less than or equal to 60%	27/03/2014, Off-site Validation Activity
33	Sri Lanka	91.59	More than or equal to 75%	25/10-04/11/2010, CMA Audit
34	Thailand	84.62	More than or equal to 75%	27/8-8/9/2025, CMA Audit
35	Timor Leste	23.58	Less than or equal to 60%	07-10/12/2010, CMA Audit
36	Tonga	27.78	Less than or equal to 60%	18-27/11/2019, ICVM
37	Tuvalu		Less than or equal to 60%	Nil USOAP Activity
38	Vanuatu	21.82	Less than or equal to 60%	18-27/11/2019, ICVM
39	Viet Nam	83.72	More than or equal to 75%	15-27/05/2024, CMA Audit

Status of RST Establishment based on ICAO RST Survey and State's Response to ICAO APAC SL Ref.: T 11/5.13.2 – AP111/24 (AGA) on 3 September 2024

States	Number of Aerodromes that Established RST	% Established	No information or Not Established	Total Aerodromes
Afghanistan	0	0%	4	4
American Samoa	0	0%	1	1
Australia	4	14%	24	28
Bangladesh	0	0%	4	4
Bhutan	1	50%	1	2
Brunei Darussalam	1	100%	0	1
Cambodia	0	0%	3	3
China	88	95%	5	93
Cook Islands	0	0%	2	2
DPR Korea	0	0%	2	2
Fiji	1	50%	1	2
French Polynesia	0	0%	1	1
Guam	0	0%	1	1
Hong Kong, China	1	100%	0	1
India	20	47%	23	43
Indonesia	23	70%	10	33
Japan	7	18%	31	38
Kiribati	0	0%	2	2
Lao PDR	0	0%	4	4
Macao, China	1	100%	0	1
Malaysia	19	100%	0	19
Maldives	5	100%	0	5
Marshall Islands	0	0%	1	1
Micronesia	1	25%	3	4
Mongolia	1	33%	2	3
Myanmar	3	100%	0	3
Nauru	0	0%	1	1
Nepal	3	100%	0	3
New Caledonia	0	0%	1	1
New Zealand	3	43%	4	7
Niue	0	0%	1	1
N. Mariana Is.	0	0%	3	3
Pakistan	9	90%	1	10
Palau	0	0%	1	1
Papua New Guinea	0	0%	1	1
Philippines	9	100%	0	9
Republic of Korea	8	100%	0	8

States	Number of Aerodromes that Established RST	% Established	No information or Not Established	Total Aerodromes
Samoa	0	0%	2	2
Singapore	2	100%	0	2
Solomon Islands	0	0%	2	2
Sri Lanka	1	25%	3	4
Thailand	10	100%	0	10
Timor Leste	0	0%	3	3
Tonga	0	0%	2	2
Tuvalu	0	0%	1	1
Vanuatu	0	0%	3	3
Viet Nam	1	10%	9	10
Wallis et Futuma	0	0%	1	1
Total	**222**	**57.51%**	**164**	**386**

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION
[Updated at APANPIRG/36]

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

Updated on ~~16 Dec. 2020~~ 6 July 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>Afghanistan</u>							
Annex 14 Volume I	**Herat International Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Aerodrome Certification is in due course of implementation, in accordance with the certification road map, by completing the outstanding corrective actions, followed by a verification audit of the aerodrome operator, with respect to the outcomes of the verification audit, either a conditional or final aerodrome certificate will be issued.	Directorate of AGA and ANS Safety	1 December 2027	A
	Kabul International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Aerodrome Certification is in due course of implementation, in accordance with the certification road map, by completing the outstanding corrective actions, followed by a	Directorate of AGA and ANS Safety	1 June 2027	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					verification audit of the aerodrome operator, with respect to the outcomes of the verification audit, either a conditional or final aerodrome certificate will be issued.			
	Kandahar International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Aerodrome Certification is in due course of implementation, in accordance with the certification road map, by completing the outstanding corrective actions, followed by a verification audit of the aerodrome operator, with respect to the outcomes of the verification audit, either a conditional or final aerodrome certificate will be issued.	Directorate of AGA and ANS Safety	1 July 2028	A
	Mazar-e-Sharif Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Aerodrome Certification is in due course of implementation, in accordance with the certification road map, by completing the	Directorate of AGA and ANS Safety	1 Sep 2027	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					outstanding corrective actions, followed by a verification audit of the aerodrome operator, with respect to the outcomes of the verification audit, either a conditional or final aerodrome certificate will be issued.			
Annex 14 Volume I PANS-Aerodromes PANS-AIM	**AIP**	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.	Following the issuance of the conditional or final aerodrome certificates, update AIP Afghanistan to publish the certification status of all certified aerodromes and ensure that the information remains current.	Directorate of AGA and ANS Safety	Within 30 days after the issuance of the certificates	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 22 August 2025

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>Bangladesh</u>							
Annex 14 Volume I	**Hazrat Shahjalal International Airport, Dhaka**	**Runway**	**ICAO mission April 2009**	Runway strip width insufficient (280m strip not available for the full length of runway);	runway strip in accordance with Annex 14, Volume I will be provided	CAABD	Runway strip width 280 m available for the full length of runway (Mitigation measures for storm water drain on the western side strip, is being replaced with concrete hollow pipes into graded surface. Construction work has been completed for around 1300 m out of the 3200 m length of the runway and the total work will be completed by June 2026. No obstructions on graded area).	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on ~~11 March 2025~~ 6 August 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Brunei Darussalam							
Annex 14 Volume I	**Brunei International Airport**	**Taxiway (Marking)**	ICAO Mission of April 2011	Non provision of enhanced taxiway centre line marking in accordance with Para 5.2.8 of Annex 14, Volume I	Both Northern Parallel Taxiway and Southern Parallel Taxiway Centre line have been repainted with enhanced taxiway centre line marking with yellow and enhanced with black borders on each side in accordance with Para 5.2.8 of Annex 14, Volume I. Note: Southern Parallel Twy has been closed since Q4 2024 until 1st Quarter 2026 due to upgrading under Pavement Rehabilitation Project Phase 2	Airport Operator (DCA Aerodrome Division)	Completed in Q4 2024 **ICAO APAC Comments:** Evidence of corrective action taken provided by Brunei were not sufficient to close this deficiency.	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
		Taxiway Strip		Objects on taxiway strips; vegetation on pavement joints and maintenance of joints	Obstacles on or near taxiway strips are relocated as per clearance for critical aircraft using the aerodrome. Vegetation on pavement joints have been removed and maintenance of joints on taxiway strips are carried out by contractors.	Airport Operator (DCA Aerodrome Division	Completed in Q4 2024 **ICAO APAC Comments:** Evidence of corrective action taken provided by Brunei were not sufficient to close this deficiency.	A
		Apron		non provision of ICAO compliant signage in accordance with section 5.4 Annex 14, Volume I	Airfield signages have always been provided at BIA that follow ICAO standards and measurement. Recent replacement of old and faded labels have also been completed in 2018.	Airport Operator (DCA Aerodrome Division)	Replacement of non provision of ICAO compliant information signages to apron were completed in July 2024. **ICAO APAC Comments**: Evidence of corrective action taken provided by Brunei were not sufficient to close this deficiency.	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
		Rescue and Fire Fighting (RFF):		non provision of direct access for the rescue and fire fighting vehicles from the fire station into the runway;	Direct access for the rescue and fire fighting vehicles from the fire station into the runway has been considered to be included within the Second Phase of the Airfield Pavement Rehabilitation Project under variation Order which is estimated to be completed by 1 st Qtr .2026	Airport Operator (DCA Aerodrome Division)	1 st Qtr. 2026	A
		Wildlife Hazards:		Establishing a national bird control committee in accordance with APANPIRG Conclusion 18/1.	Aerodrome Division headed by Head of Aerodrome to firstly establish an in-house small airport wildlife committee	Airport Operator (DCA Aerodrome Division)	4 th Qtr. 2025	B
	~~**Brunei International Airport**~~	~~**Aerodrome Certification**~~	~~Effective from 1 Jan 2021~~	~~Aerodrome yet to be certified.~~	~~Airport operator is targeting Q4 2025 to possess an aerodrome certificate. Currently airport is still developing its aerodrome manual and sms manual.~~	~~Airport Operator (DCA Aerodrome Division)~~	~~4 th Qtr. 2025~~ Certified on 6 August 2026 [Resolved]	~~A~~

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I PANS-Aerodromes PANS-AIM	**AIP**	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.	Airport operator is targeting Q4 2025 to possess an aerodrome certificate and certification publishment into AIP AD 1.5 should follow.	Airport Operator (DCA Aerodrome Division)	4 th Qtr. 2025	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 25 June 2024

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>China</u>							
Annex 14 Volume I	**Hualien Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A
	Taichung Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A
	Tainan Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 03 July 2025

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	FIJI							
Annex 14 Volume I para 5.3.4.19	**Nadi International Airport** RWY 02 CAT 1 Approach Lighting System (HIALS)	RWY 02 partially meets the CAT 1 Approach Lighting System requirement for cross bar placement at 150m, 450m, and 750m. The current setup of the RWY 02 Approach Lighting System is a 900m extended centerline with three (3) crossbars at 300m, 600m, & 900m.	03/07/25	RWY 02 is a Precision Approach Runway Category 1	The Aerodrome operator will install additional crossbar lights, to ensure compliance with specifications set forth for a CAT 1 Approach Lighting System prescribed in Annex 14. i.e. Additional crossbars will be installed at 150m, 450m & 750m and the crossbar at 900m will be removed.	Fiji Airports	30/12/2026	B

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 25 June 2024

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>India</u>							
Annex 14, Volume I	**Mumbai International Airport**	**Runway**	**AGA mission January 2009**	Runway strip is insufficient 300m strip width is not available for the full length of runway 09/27 in accordance with 3.4.3 of Annex 14, Volume I.	280m strip width for full length of runway 09/27 will be made available	MIAL	**<u>31 Dec 2026</u>** Land acquisition in progress. MIAL has filed temporary exemption with DGCA for non-compliance. Due to presence of slum in beginning of RWY 09/27 south – RWY strip 280m not available.	A
Annex 14 Volume I	**Chandigarh Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified. – Defence Aerodrome				A
Annex 14 Volume I	**Goa Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified. – Defence Aerodrome				A
Annex 14 Volume I	**Port Blair Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified. – Defence Aerodrome				A
Annex 14 Volume I	**Pune Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified. – Defence Aerodrome				A
Annex 14 Volume I	**Srinagar Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified. – Defence Aerodrome				A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	India							
Annex 14	**Gorakhpur (VEGK)**	**Aerodrome Certification**	25 June 2024	Aerodrome yet to be certified. – Defence Aerodrome				A
Volume I	**Hindan (VIDX)**	**Aerodrome Certification**	25 June 2024	Aerodrome yet to be certified. – Defence Aerodrome				A
Annex 14	**Jodhpur (VIJO)**	**Aerodrome Certification**	25 June 2024	Aerodrome yet to be certified. – Defence Aerodrome				A
Volume I	**Visakhapatnam (VOVZ)**	**Aerodrome Certification**	25 June 2024	Aerodrome yet to be certified				A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 16 June 2023

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I	**<u>Kiribati</u>** **Christmas Island Airport, Kiritimati**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Issued with the Interim Certificate since the Operator is not yet fully complied to the requirements	Airport Kiribati Authority	31 Dec 2023	A
	Bonriki International Airport, Tarawa	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	The Aerodrome Operator is not yet fully complied to the requirements	Airport Kiribati Authority	31 Dec 2023	A
Annex 14 Volume I PANS-Aerodromes PANS-AIM	**AIP**	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.	The AIP will be amended to include this deficiency	Civil Aviation Authority of Kiribati (CAAK)	15 Oct 2023	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 10 June 2025

Identification		**Deficiencies**			**Corrective Action**			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I	**<u>Lao PDR</u>** **Wattay International Airport**	**Taxiway**	**ICAO Mission of March 2011**	Provision of stop bars at runway-holding position in accordance with Para 5.3.20 of ICAO Annex 14, Volume I	AOL request exemption to DCAL and proposed to install in Long Term Plan.	Airport of Laos (AOL)	DCA exempt of runway hold position lights in accordance to AOL and mention in the Certification.	A
		Wildlife Hazards:		Establishing a national bird control committee in accordance with APANPIRG conclusion 18/1.	DCAL to propose prime minister decree and establish national committee accordingly.	Department of Civil Aviation of Lao PDR (DCAL)	To be completed in 2026	B
	Luang Prabang International Airport	**Taxiway**		Provision of runway hold position lights in accordance with Para 5.3.19 of ICAO Annex 14, Volume I on new taxiways	Under consideration by Airports of Laos to purpose for support the budgets and installation	AOL	We have planned budgets and installation during 2021 to 2025	A
		Aerodrome Certification	Effective from 1 Jan 2021	Aerodrome yet to be certified.		DCAL and AOL	Aerodrome Certification will be completed in December 2023 (on Process)	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Savannakhet International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.		DCAL and AOL	Aerodrome Certification will be completed in December 2025	A
	Pakse International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.		DCAL and AOL	Aerodrome Certification will be completed in December 2025	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on ~~24 March 2025~~ 27 February 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
~~**Annex 14 Volume I**~~	**Malaysia** ~~**Kuantan Haji Ahmad Shah Airport**~~	~~**Aerodrome Certification**~~	~~Effective from 1 Jan 2021~~	~~Aerodrome yet to be certified.~~	~~Coordination among Ministry of Transport, Ministry of Defense and Airport Operator are being conducted to get the aerodrome certified~~	~~Ministry of Transport and Ministry of Defense~~	~~June 2025~~ Certified on 20 January 2026 [Resolved]	~~A~~

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 25 June 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Marshall Islands							
Annex 14 Volume I PANS-Aerodromes PANS-AIM	AIP	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.	Certification of aerodrome will be published in AIP AD 1.5	RMI DCA	December 31, 2028	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 16 December 2020

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I	**<u>Micronesia (Federated States of)</u>** **Pohnpei International Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A
	FM Chuuk International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A
	Yap International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A
	Kosrae Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.				A
Annex 14 Volume I PANS-Aerodromes PANS-AIM	**AIP**	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.				A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on ~~17 April 2025~~ 30 January 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Nauru							
Annex 14 Volume I	**Nauru International Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Initiate the aerodrome certification process in accordance with ICAO Annex 14 requirements, including gap analysis, preparation of the Aerodrome Manual, stakeholder coordination, and on-site compliance inspection.	Nauru Civil Aviation Authority	Q4 2027(Subject to ICAO and Donor Support)	A
~~**Annex 14 Volume I PANS-Aerodromes PANS-AIM**~~	~~**AIP**~~	~~**Status of Certification of Aerodromes in AIP**~~	~~Effective from 1 Jan 2021~~	~~Status of certification of aerodromes yet to be published in AIP AD 1.5.~~	~~Update and publish the certification status of the aerodrome in AIP section AD 1.5 upon progress or completion of the certification process, as per PANS-AIM guidelines.~~	~~Nauru Civil Aviation Authority~~	~~Q4 2027(Subject to ICAO and Donor Support)~~ The information on the Status of Certification of Aerodromes is published in AIP AD 1.5. [Resolved]	~~A~~

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 16 December 2020

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Palau							
Annex 14 Volume I PANS-Aerodromes PANS-AIM	**AIP**	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.				A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 27 March 2024

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>Philippines</u>							
Annex 14 Volume I	**Kalibo International Airport, Akla**	**Aerodrome Certification**	Effective from 1 Jan 2021	Permanent aerodrome certificate yet to be issued.			Temporary Aerodrome Certificate issued with validity from 1 Jan. 2025 to 30 June 2025	A
	Puerto Princesa International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Permanent aerodrome certificate yet to be issued.			Temporary Aerodrome Certificate issued with validity from 11 Dec. 2024 to 9 June 2025.	A
	Bohol-Panglao International Airport	**Aerodrome Certification**	Effective from 1 Jan 2021	Permanent aerodrome certificate yet to be issued.			Temporary Aerodrome Certificate issued with validity from 30 Dec. 2024 to 29 June 2025.	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 15 June 2021

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I	**<u>Myanmar</u>** **Yangon International Airport**	**Runway/ Taxiway**	**ICAO mission April 2010**	Provision of RESA in accordance with Section 3.5 of Annex 14, Volume I requirements;	RESA will be provided	Yangon Aerodrome Company Limited	(Risk Assessment conducted by the operator submitted on 10 Aug 2018.) RESA for RWY 21 was completed on 15 Nov 2018. _____ Revised date- **31 Dec 2021**	A
		Wildlife Hazards		Establishment of a national bird committee in accordance with APANPIRG Conclusion 18/1.	Establish National Bird Committee	Department of Civil Aviation	Guideline for Wildlife Hazard Management at Aerodromes, DCA-GM-AGA 08 has been developed and published on 29 Oct 2018) Revised date- **30 Nov 2021**	B

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on ~~28 May 2025~~ 6 July 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14, Volume I	**<u>Nepal</u>** **Tribhuvan International Airport**	**Runway**	**ICAO Mission of February 2008**	Insufficient runway strip, refer recommendations given in section 3.4 of Annex 14, Volume I.	Provide runway strip as per ICAO recommendations (Remarks – Land to be acquired in this area, budget to be allocated and only further procurement process to be carried out)	Air Transport Capacity Enhancement Project (ATCEP) under Civil Aviation Authority of Nepal	• As per section 3.4 length of runway strips (60 m) before the threshold and beyond the end of the runway is already provided. • The runway is oriented approximately North-South (02-20) direction in the airport. As per recommendations given in section 3.4, the 140 m width of runway strip throughout the runway length on the West side of runway ~~centerline~~ will be available with the ~~completion of ongoing~~ parallel taxiway extension and international apron expansion work~~s~~ by 31 December 2026. TIACAO • The 140 m width of runway strip on the East side of runway centerline for northern 1340 m length of the runway will also be available with the	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
							completion of ongoing hangar area development work~~s~~ by 31 December 2026. • Width of runway strip on the East side of runway centerline for remaining 1740 m length of the runway towards the South will be provided by ~~2030~~ 31 December 2032.	

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION
[Updated at APANPIRG/36]

Updated on ~~16 May 2025~~ 29 July 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>Samoa</u>							
Annex 14 Volume I	**Faleolo International Airport**	**Runway Strip**	**ICAO Mission of Oct. 2015**	Insufficient Runway Strip	A 2013 Rule Exemption based on a comprehensive aeronautical study supports the 150 m runway strip width and the State has therefore accepted the lesser width. The recent changes to ICAO Annex 14 and NZ CAR Part 139 denote that the Faleolo Airport runway strip width meets the requirements for a non-precision instrument approach runway at 150 m overall width. The State's position remains unchanged. Samoa has filed a Difference in the ICAO Electronic Filing of Differences (EFOD) system under the ICAO USOAP Continuous Monitoring Approach	Civil Aviation Authority Samoa	Complete **<u>ICAO APAC Comments:</u>** Still non-compliance with Annex 14 Requirements.	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					(CMA) platform against Annex 14, Volume I, Standard 3.4.3 (Width of runway strips). The approved exemption remained in force.			
		Aerodrome Pavements		Lack of maintenance of aerodrome pavements in accordance with Annex 14, 10.2	Faleolo International Airport upgraded its pavement for movement area in 2019 where a PAVER (software) training was conducted for the aerodrome operator personnel on the need to have a pavement maintenance plan. The Aerodrome Operator maintains an Aerodrome Maintenance Plan which includes maintenance inspection procedures for pavement areas. Following recent audits and assessments, the plan is currently under review to incorporate relevant recommendations	Aerodrome Operator	December 2026	U

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					aimed at further enhancing pavement maintenance practices.			

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 27 March 2024

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I	**<u>Solomon Islands</u>** **Honiara International Airport/Henderson Field**	**Runway Strip**	**ICAO Mission of Oct. 2015**	Insufficient Runway Strip				A
		RESA		RESA at both ends of runway not provided				U
		Aerodrome Pavements		Lack of maintenance of aerodrome pavements in accordance with Annex 14, 10.2				U

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on ~~15 June 2022~~ 27 July 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Sri Lanka							
Annex 14 Volume I	**Bandaranaike International Airport**	**Runway/ Taxiway**	**ICAO mission April 2010**	Provision of 280m strip width for the full length of precision approach CAT I runway in accordance with the standard 3.4.3, Annex 14, Volume I; remove obstacles from runway strip; flush the strip with the adjacent runway shoulder.	runway strip in accordance with Annex 14, Volume I will be provided, obstacles from strip will be removed and flush strip with adjacent runway shoulder.	CAASL	~~Statistical analysis submitted by AASL has been accepted in 2021. Request made to submit the improved risk assessment with necessary amendments within 2022.~~ Short Term: Improved risk assessment was reviewed by the CAASL and referred to RST for incorporating additional mitigatory measures for identified risks. CAASL plans to complete the task by 15th October 2026. Long Term: CAASL notified Aerodrome Operator to prepare a long-term corrective action plan to establish 280m runway strip at BIA. Timeline to be agreed between CAASL and Aerodrome Operator.	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
		Wildlife Hazards:		Establishment of a national bird committee in accordance with APANPIRG Conclusion 18/1.	National Bird Committee will be established.		~~A meeting to be held with all stakeholders to establish the Committee and to ratify the TOR by end of September 2022.~~ Line Ministry has accepted the TOR and agreed to establish the NWHMC and Cabinet Memorandum has been submitted for approval to establish the NWHMC. NWHMC will be established by 31st October 2026.	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on ~~5 November 2025~~ 7 July 2026

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>Thailand</u>							
Annex 14, Volume I	**Phuket International Airport**	**Runway (RESA)**	**AGA mission of July 2009**	RESA to satisfy Section 3.5 of Annex 14, Volume I requirements.	RESA will be provided at the end of both RWY09 and RWY27 to satisfy Section 3.5 of Annex 14, Volume I requirements. Remark: - Dimension of RESA RWY09 is 150x190 m. - Dimension of RESA RWY27 is 150x120 m.	Airports of Thailand Public Company Limited	~~The construction is expected to be completed in Jul 2025.~~ ~~Airports of Thailand Public Company Limited already has had the contractor for this construction's project and the safety assurance and project management documentation has been approved by the Civil Aviation Authority of Thailand to ensure that the aerodrome can continue to operate safely during the project. Currently, the construction progress is 84%.~~ The construction for RESA Runway 09 has been completed, with final dimensions measuring 150 by 190 meters. Meanwhile, RESA Runway 27 is currently unavailable as discussions are ongoing with stakeholders to re-declare the distance.	U

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
							Temporary exemption has been granted until 24 February 2027.	
		Runway Strip		Runway strip width insufficient (280m runway strip for precision approach runways in accordance with Para 3.4.3 of Annex 14, Volume I.	300m runway strip width will be made available. Except 111.4m length at the beginning of RWY09 (60m strip length before RWY09 threshold plus 51.4m length beyond the threshold), the runway strip width will be extended 150m on the right side of RWY09 centre line and 90.27m on the left side of the runway centre line (due to the marsh near the runway).	Airports of Thailand Public Company Limited	~~The construction is expected to be completed in Jul 2025.~~ ~~Airports of Thailand Public Company Limited already has had the contractor for this construction's project and the safety assurance and project management documentation has been approved by the Civil Aviation Authority of Thailand to ensure that the aerodrome can continue to operate safely during the project. Currently, the construction progress is 84%.~~ The construction has been completed. However, the runway strip width remains non-compliant with the ICAO Annex 14 standard due to site limitations—specifically, the presence	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
							of a peat swamp forest at the Runway 09 threshold, which requires government regulatory approval for land use. While an exemption has been granted until 25 August 2026, Airports of Thailand Public Company Limited is currently conducting a safety risk assessment to support a request for its extension.	

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 25 November 2025

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Timor-Leste							
Annex 14 Volume I	**Commander-in-Chief of the FALINTIL – Kay Rala Xanana Gusmão International Airport, Suai (WPDB)**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	To be certified under category 3C, the significant safety related to the Aerodrome (AD) strip—specifically, the presence of local houses and inhabitants within the area—must be resolved. • The relocation of houses and inhabitants within the AD strip is currently in progress. • Efforts are underway to establish key documentation, including manuals, standard operating procedures (SOPs), and the formation of various airport committees such as the Airport Emergency Response Plan (AERP) and	Gov. TL and ANATL as AD operator	• The original estimated completion date for the project was 31 December 2024. However, due to a range of challenges encountered by the airport operator-such as delays in the relocation of residents within the aerodrome strip, logistical constraints, and the complexity of coordinating multiple ongoing infrastructure and regulatory developments—the timeline has been revised. • As a result, the new estimate completion date has been extended to 31 December 2025. This extension will allow sufficient time to address the outstanding safety issues, finalize the installation and calibration of critical navigation aids (such as AWOS, D-VOR, and PAPIs), and complete	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					Airport Security Program (ASP). • At present, the aerodrome is occasionally used for domestic general aviation and helicopter operations only. • The installation and calibration of the Automated Weather Observing System (AWOS), Doppler VHF Omnidirectional Range (D-VOR), and Precision Approach Path Indicators (PAPIs) are ongoing. These improvements are intended to facilitate the relocation of all helicopter operations to Dili, aligning with the broader airport certification process.		the necessary administrative and operational preparations required for airport certification under category 3C.	

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	Rota de Sândalo International Airport, Oe-Cusse (WPOC)	**Aerodrome Certification**	Effective from 1 Jan 2025	Aerodrome yet to be certified.	To achieve certification under its designated runway category (4C), the airport operator is actively undertaking several preparatory actions. These include: • The development of comprehensive airport manuals, the formulation of standard operating procedures (SOPs), and the establishment of key airport committees such as the Airport Security Committee-Runway safety and Compliance Assessment (ASC-RSCA) and the Emergency Response Committees (ERC). • Currently, the aerodrome (AD) is only used occasionally for	Gov. TL and ANATL as AD operator	Estimated date: 31 December 2025	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					domestic operations and helicopter movements. • In early May 2025, the airport operator submitted an official Expression of Interest (EOI) for certification. Following this, a certification roadmap was established, outlining the key milestones and deliverables required to meet the 4C standard. A dedicated technical team has been formed and has commenced the formal assessment of the application, in alignment with the established roadmap and regulatory requirements.			

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 27 March 2024

Identification		**Deficiencies**			**Corrective Action**			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
	<u>Tonga</u>							
Annex 14 Volume I	**Fua'amotu International Airport**	**Runway Strip**	**ICAO Mission of Oct. 2015**	Insufficient Runway Strip	1. File of difference to ICAO Annex 14 Volume I 3.4.4 through CMA-OLF and the publication of significant difference in the AIP Tonga - CAR 139.C.2.2 details that the strip width for aerodrome reference code number 4, non-precision runway must extend laterally on each side of the centre line of the runway and its extended centre line throughout the length of the strip to the minimum distance of 75m. 2. Provide 240m	CAD Office	1. 28 December 2023 2. 31 December 2030	A

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
					runway strip width at Fuaámotu International Airport.			

AIR NAVIGATION DEFICIENCIES IN AOP FIELD IN THE ASIA/PACIFIC REGION

[Updated at APANPIRG/36]

Updated on 1 November 2022

Identification		Deficiencies			Corrective Action			
Requirements	**States/facilities**	**Description**	**Date first reported**	**Remarks**	**Description**	**Executing body**	**Target date of completion**	**Priority for action****
Annex 14 Volume I	**<u>Tuvalu</u>** **Funafuti International Airport**	**Aerodrome Certification**	Effective from 1 Jan 2021	Aerodrome yet to be certified.	Aerodrome yet to be certified.		Part 139 Aerodrome Certification in progress for 2023	A
Annex 14 Volume I PANS-Aerodromes PANS-AIM	**AIP**	**Status of Certification of Aerodromes in AIP**	Effective from 1 Jan 2021	Status of certification of aerodromes yet to be published in AIP AD 1.5.	Status of certification of aerodromes yet to be published in AIP AD 1.5.		Update Tuvalu AIP Info	A

* Priority for action to remedy the shortcoming is based on the following safety assessments:

"U" priority = Urgent requirements having a direct impact on safety and requiring immediate corrective actions. Urgent requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is urgently required for air navigation safety.

"A" priority = Top priority requirements necessary for air navigation safety. Top priority requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is considered necessary for air navigation safety.

"B" priority = Intermediate requirements necessary for air navigation regularity and efficiency. Intermediate priority requirement consisting of any physical, configuration, material, performance, personnel or procedures specification, the application of which is considered necessary for air navigation regularity and efficiency.

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APANPIRG
AERODROMES OPERATIONS AND PLANNING SUB-GROUP (AOP/SG)

LIST OF AOP FOCAL POINTS [Updated on 8 June 2026]

	NAME		TITLE/ORGANIZATION	TEL/FAX NUMBER	E-MAIL
1.	**AFGHANISTAN**				
	1.	Engineer Najibullah	Head of Aerodrome Standardization Afghanistan Civil Aviation Authority	–	najib0107@gmail.com;
2.	**AUSTRALIA**				
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	18.	Mr. Yat Tsun HUI	Acting Senior Safety Officer (Airport) Civil Aviation Department	Tel: +852-2910 6973 Fax: +852-2795 8469	ythui@cad.gov.hk;
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11.	**FIJI**				
	23.	Mr. Ratu Maibulu Q. Laliqavoka	Technical Officer Aerodromes, Ground Safety Department Civil Aviation Authority of Fiji Private Mail Bag NAP 0354, Nadi International Airport, Nadi	Tel: +679 672 1555 Mob: +679 992 8949	maibulu.laliqavoka@caaf.org.fj ;
12.	**INDIA**				
	24.	~~Mr. Dinesh Chand Sharma~~	~~Joint Director General of Civil Aviation~~ ~~Directorate General of Civil Aviation~~ ~~Aerodrome Standards Directorate,~~ ~~DGCA Hqrs.,~~ ~~New Delhi 110003~~	~~Tel: +91 11 2465 3883~~	~~desharma.dgca@nic.in;~~
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	84. ~~Capt. Marie Zubryckyj~~ Capt. Tiziano Ponseggi	~~Programme Coordinator~~ ~~COSCAP South Asia~~ ~~Dhaka 1229, Bangladesh~~ Chief Technical Advisor (CTA) COSCAP-South Asia Male, Maldives	~~Tel: +880 2 8901497~~ ~~Fax: +880 2 8901498~~ Tel: +960 9 912200	~~mzubryckyj@icao.int~~; tponseggi@icao.int;
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ASIA PACIFIC GENERIC GUIDANCE MATERIALS AND CUSTODIANS

Procedure for periodic review and update of the Asia/Pacific Generic Guidance Materials in the area of Aerodromes and Ground Aids
[~~Third~~ Fourth Edition, ~~July 2025~~ August 2026 approved by ~~AOP/SG/9~~ AOP/SG/10]

1. INTRODUCTION

1.1 In accordance with the TORs and task lists of the various Working Groups and Task Forces of AOP/SG, a number of Generic Guidance Materials (GGMs) were developed by these Working Groups/Task Forces and approved by AOP/SG and APANPIRG. All Generic Guidance Materials are published on ICAO APAC Website at eDocuments Webpage under AGA heading for use/reference by States/Administrations and can be accessed using URL:
~~https://www.icao.int/APAC/Pages/eDocs.aspx~~
https://www.icao.int/APAC/apac-electronic-documents.

1.2 The list of Asia/Pacific GGMs developed by various Working Groups and Task Forces and approved by AOP/SG and APANPIRG including the details of the Custodians is provided in **Attachments A to ~~D~~ C**.

2. PROCEDURE

2.1 The Working Groups/Task Forces identify a custodian of the individual Asia/Pacific GGM from State(s)/ International Organization(s)/Industries with the responsibility to review and update the respective Asia/Pacific GGM(s) in coordination with ICAO APAC Office whenever it becomes necessary.

2.2 For periodic review and update of the Asia/Pacific GGMs in the area of AGA in future, the following process should be followed by the Custodians and the Secretariat:

a) The Secretariat would inform to the respective custodian(s) of the Asia/Pacific GGM(s) once ICAO approved amendments to ICAO SARPs and PANS-Aerodromes (Doc 9981), revisions to Airport Services Manuals and other relevant ICAO documents that may necessitate the review and update of the GGM(s);

b) The Secretariat/Custodian(s) exchange information about newly developed States/Industries good practices relevant to Asia/Pacific GGM(s) as soon as they become aware of their availability;

c) The custodian of the respective GGM coordinates with the relevant subject matter experts of the respective Working Group/Task Force and the Secretariat to initiate the review of the GGM;

d) Once the review and revision of the GGM is completed the custodian would present the revised GGM through the Working Paper at the respective WG/TF meeting for its endorsement with a draft conclusion for adoption by the AOP/SG; and

e) After the adoption of the draft conclusion by the AOP/SG the revised GGM(s) should be uploaded by the Secretariat on the ICAO APAC Website on eDocuments Webpage under AGA heading.

Attachment A

List of GGMs developed by AP-AA/WG and approved by AOP/SG with details of the custodians

S. No	APAC Generic Guidance Materials	Edition/Version, Date	States involved in the Development of Generic Guidance Materials	Custodian (Responsible party for future reviews and updates)
1	Asia Pacific Regional Guidance on AIP – AD 1.5 Status of Certification of Aerodromes	Version 1.0, Dec 2020	Secretariat	**ICAO Secretariat** apac@icao.int ~~pshakya@icao.int~~
2	Generic Aerodrome Certification Procedure	Version 1.0, Dec 2020	Thailand (lead) and Philippines	**Thailand** Mr. Teeravee Yongwattanajiaranon (Ling) teeravee.y@caat.or.th
3	Generic Procedures for Accepting Non-compliance in Aerodromes	Version 1.0, Dec 2020	Nepal (lead) and Malaysia	**Nepal** Mr. Babu Ram Paudel paudelbabu@gmail.com
4	Generic Training Programme and Training Plan for Aerodrome Inspectors	Version 1.0, 2 July 2021	India	**India** Mr. Amit Srivastava amits.dgca@nic.in
5	Generic Aerodrome Inspector Handbook	Version 2.0, 2023	Thailand (lead) and Bangladesh	**Thailand** Mr. Teeravee Yongwattanajiaranon (Ling) teeravee.y@caat.or.th
6	Generic Aerodrome Manual	Version 1.0, 2 July 2021	India	**India** Mr. Amit Srivastava amits.dgca@nic.in
7	Generic Aerodrome Certification Specific Operating Regulations	Version 1.0, 2 July 2021	Malaysia (lead), India and Nepal	**Malaysia** Mr. Mahyuddin Bin Sajuri mahyuddin@caam.gov.my
8	Generic Organization Structure of the Aerodrome Regulatory Unit	Version 1.0, 2 July 2021	Malaysia (lead), India and Nepal	**Malaysia** Mr. Mahyuddin Bin Sajuri mahyuddin@caam.gov.my
9	Generic Surveillance Programme by Aerodrome Operators	Version 1.0, 2 July 2021	Malaysia (lead), India and Nepal	**Malaysia** Mr. Mahyuddin Bin Sajuri mahyuddin@caam.gov.my

S. No	APAC Generic Guidance Materials	Edition/Version, Date	States involved in the Development of Generic Guidance Materials	Custodian (Responsible party for future reviews and updates)
10	Generic Surveillance Programme for Certified Aerodromes	Version 1.0, August 2022	Malaysia (lead), India and Nepal	**Malaysia** Mr. Mahyuddin Bin Sajuri mahyuddin@caam.gov.my
11	ICAO Asia-Pacific Aerodrome Assistance Go-Team Methodology	March 2024	ACI	**ACI** Ms. Badriyah Binti Noordin badriyah@aci-asiapac.aero; **ICAO Secretariat** apac@icao.int
12	Asia-Pacific Generic Aerodrome Enforcement Policy and Procedures Manual	October 2023	Malaysia (Lead) and India	**Malaysia** Mr. Mahyuddin Bin Sajuri mahyuddin@caam.gov.my
13	Asia-Pacific Generic Aerodrome Exemptions Policy and Procedures Manual	October 2023	Australia (Lead) and India	**Australia** Mr. Darren Angelo darren.angelo@casa.gov.au;
14	Asia-Pacific Generic Aerodrome SMS Evaluation Tool and Guidance	First Edition, September 2024	Thailand (Lead), Australia, and Maldives.	**Thailand** Ms. Angsana Panmongkon angsana.r@caat.or.th
15	Asia/Pacific Guidance on Runway Classification	First Edition, July 2025	Thailand (Lead), India and Pakistan	**Thailand** Mr. Witsarut Chinwipat witsarut.c@caat.or.th **India** Mr. D. K Mandal dhusar.dgca@gov.in
16	Asia/Pacific Regional Guidance on Aerodrome Operations Personnel Competency Requirement Framework	Version 1.0 – December 2020	Bangladesh, Cambodia, China, Macao, China, Maldives, Singapore, ACI (Lead)	**ACI** Ms. Badriyah Binti Noordin badriyah@aci-asiapac.aero; **Maldives** Ms. Aminath Shiznee shiznee@caa.gov.mv;

Attachment B

List of GGMs developed by AP-WHM/WG and approved by AOP/SG with details of the custodians

S. No	APAC Generic Guidance Materials	Edition/Version, Date	States involved in the Development of Generic Guidance Materials	Custodian (Responsible party for coordination for future reviews and updates)
1	Composition of National Wildlife Hazard Management Committee	Sep. 2019	Nepal, Bhutan, Lao PDR	**Nepal** Mr. Deo Chandra Lal Karna, d_karna@hotmail.com
2	Terms of References of National Wildlife Hazard Management Committee	Sep. 2019	Nepal, Bhutan, Lao PDR	**Nepal** Mr. Deo Chandra Lal Karna, d_karna@hotmail.com
3	Asia Pacific Guidance for Evaluation of Aerodrome Wildlife Hazard Management Programme	First Edition, 2 July 2021	WBA, Australia, Bangladesh, India, Thailand and ACI	**WBA** Ms. Lalita Vaswani lalita@worldbirdstrike.com
4	Asia Pacific Guidance for Establishment of National Procedure for Recording and Reporting Wildlife Strikes to Aircraft	First Edition, 2 July 2021	Philippines, Sri Lanka, Nepal, WBA, IFALPA	**WBA** Ms. Lalita Vaswani lalita@worldbirdstrike.com
5	Asia Pacific Guidance on Development and Implementation of Airport Wildlife Hazard Management Programme	First Edition, August 2022	Australia, Fiji, India, WBA, AAPA	**WBA** Ms. Lalita Vaswani lalita@worldbirdstrike.com
6	ICAO Asia Pacific Wildlife Hazard Management Go-Team Methodology	Second Edition, November 2024	Australia, India, Thailand, ACI and WBA	**Australia** Mr. Ashley McAlpine Ashley.Mcalpine@casa.gov.au

Attachment C

List of GGMs developed by AP-ADO/TF and approved by AOP/SG

S. No	APAC Generic Guidance Materials	Edition/Version, Date	States involved in the Development of Generic Guidance Materials	Custodian (Responsible party for coordination for future reviews and updates)
1	Sample APAC Regulations for Water Aerodromes	First Edition (unedited version) — March 2015	Indonesia, Maldives (Lead), Sri Lanka, New Zealand and USA	~~CAA~~ **Maldives** Ms. Fathimath Ramiza ~~Email:~~ ramiza@caa.gov.mv
2	Asia Pacific Regional Guidance on Requirements for the Design and Operations of Water Aerodromes for Seaplane Operations	First Edition — January 2019	Indonesia, Maldives (Lead), Sri Lanka, New Zealand and USA	~~CAA~~ **Maldives** Ms. Fathimath Ramiza ~~Email:~~ ramiza@caa.gov.mv
3	Guidance on Transposition of Annex 14 ICAO SARPS	Version 1.0 – July 2025	Malaysia (Lead), Australia, Thailand and ACI	**Malaysia** Mr. Mahyuddin Bin Sajuri mahyuddin@caam.gov.my
4	Asia/Pacific Regional Guidance on Risk Assessment and Mitigation Measures for Lights with the Hazardous Effects	Version 1.0, August 2026	India (Lead), Nepal, Thailand and the Republic of Korea	**India** Mr. Chandra Mani Pandey cmani.dgca@nic.in
5	Asia Pacific Regional Guidance on Strength Assessment and Classification of Unpaved and Grassed Runways	Version 1.0, August 2026	Papua New Guinea (Lead), Australia, Nepal and New Zealand	**Papua New Guinea** Mr. Percy Sukbat psukbat@casapng.gov.pg

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AOP/SG WORK PROGRAMME AND TASK LIST
[Updated by AOP/SG/~~9~~ 10]

The priorities assigned in the list have the following connotation:
High = Tasks of a high priority on which work should be expedited;
Medium = Tasks of medium priority on which work should be under taken as soon as possible but not to the detriment of the High tasks; and
Low = Tasks of medium priority on which work should be undertaken as time and resources permit but not to the detriment of High and Medium priority tasks.

TOR = Terms of Reference of the AOP Sub-Group

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/1 (14 – 16 June 2017):								
AOP/SG/1/1	APANPIRG 18 Conclusion 18/62 APANPIRG 21 Conclusion 21/54	Safety	AOP Air Navigation Deficiencies Assist States to establish action plans with fixed target dates for resolution of safety related deficiencies	High	1) Monitor resolution of AOP air navigation deficiencies *Please refer to the Task AOP/SG/2/2*	AOP/SG	December 2021	*Moved to Task* AOP/SG/2/2 **[COMPLETED]**
AOP/SG/1/2	APANPIRG 27 TOR of AOP/SG	Safety, Capacity & Efficiency	Assist in and monitor the implementation of Airport Collaborative Decision Making (A-CDM) at aerodromes used for international operations in APAC Region through APA-CDM/TF.	High	Monitor the status of implementation of A-CDM at aerodromes used for international operations	AOP/SG and APA-CDM/TF	Nov. 2021	AOP/SG/5-WP/05: - Dissolution of the Task Force and remaining works will be taken care by other APANPIRG Contributory body (ATFM/SG) **[COMPLETED]**

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/1/3	APANPIRG 27	Safety	Develop regional guidelines on aerodrome operations personnel competency (AOPC) requirements through AOPC Working Group	Medium	Develop regional guidance material	AOP/SG and AOPC SWG	May 2019	Refer to AOP/SG/4 WP/08 **[COMPLETED]**
AOP/SG/1/4	APANPIRG 27/34	Safety	Monitor States provide updated information about airport´s Obstacle Limitation Surface (OLS) in AIP	High	Monitor OLS of airports through AP-ADO/TF	States, AOP/SG	Continuous	Ongoing
					(Please refer to the Task AOP/SG/2/3)			
AOP/SG/2 (27 - 29 June 2018):								
AOP/SG/2/1	APANPIRG/18 Conclusion 18/1 APANPIRG Conclusion 21/2 RAN meeting –Asia/PAC/3, rec 4/6	Safety	Wildlife strike hazard reduction programme	High	Establish Wildlife Hazard Management Working Group (WHM WG)	AOP/SG, ICAO APAC Office AP-WHM/WG	Continuous	Established AP-WHM/WG. **[COMPLETED]** AOP/SG/6 – WP/07: – Draft Conclusion AP–WHM/WG/4–1: State Action Plan for Establishment and Implementation of WHMP - Generic Template (Appendix D to AOP/SG/6 Report) Ongoing

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
								– Developed Asia Pacific Regional Guidance on Development and Implementation of Wildlife Hazard Management Programme (Appendix E to AOP/SG/6 Report) **[COMPLETED]**
AOP/SG/2/2	Beijing Declaration 2018 APANPIRG APAC ANP, Doc 9673, Volume I		1) Assist States in implementation of ICAO aerodrome certification requirement and resolution of air navigation deficiencies;	High	Establish an Asia/Pacific Aerodrome Assistance Working Group (AP-AA WG) Monitor resolution of AOP air navigation deficiencies	AOP/SG; ICAO APAC Office AP-AA/WG	31 October 2018 Continuous	Established AP-AA/WG. **[COMPLETED]** Ongoing

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/2/3	TOR of AOP/SG Asia Pacific Air Navigation Plan		(1) Review and monitor provisions of facilities, installations and services at international aerodromes: - visual aids; - rescue and firefighting services and emergency planning; - measurement and reporting by States of the surface condition and unevenness on runway; - preventive maintenance programme; - runway safety programme. (2) Review and monitor the content of the Table AOP I - 1 and, where necessary, after coordination with users and operators, and introduce the respective changes to the APAC ANP and Table AOP II – 1 through the established ICAO procedures.	High	Establish Asia/Pacific Aerodrome Design and Operation Task Force (AP-ADO/TF) Tasks to be carried out by AP-ADO/TF	AOP/SG; ICAO APAC Office AP-ADO/TF	31 October 2018 Continuous Continuous	Established AP-ADO/TF. **[COMPLETED]** Ongoing Ongoing AOP/SG/10 – WP/10: APAC ANP

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/3 (24 - 26 June 2019):								
AOP/SG/3/1	55th DGCA Action Item 55/42	Safety	Certification of aerodromes used for international operations by 2020 (Beijing Declaration's Commitment)	High	Monitor the progress of certification and report to DGCA through APANPIRG	AOP/SG through AP-AA/WG	Continuous	Ongoing AOP/SG/10 – WP/15: – 356 out of 386 certified – 92.23%
AOP/SG/4 (10 – 13 November 2020):								
AOP/SG/4/1	Draft Conclusion AOP/SG/4-10	Safety	States/Administrations to develop and implement GRF Implementation Action Plan	High	Monitor the GRF Implementation Action Plan developed by States/Administrations	States AOP/SG	Continuous	Ongoing AOP/SG/10 – WP/22: GRF – 18 States published procedures for assessment and reporting runway conditions in AIP

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/4/2	AOP/SG/4 Report on WP/12	Safety	States to arrange necessary resources to recruit, train and retain qualified and experienced technical staff to effectively perform safety oversight of aerodromes to enhance USOAP Effective Implementation score to at least 75% in AGA area by 2024	High	Provide technical assistance to States with limited resources and low AGA EI	States AP-AA/WG	Continuous	Aerodrome Assistance Go-Team Methodology AOP/SG/10 – IP/04
AOP/SG/4/3	AOP/SG/4 Report on WP/11	Safety	Assist States in certification of aerodromes used for international operations	High	Provide technical assistance to States with aerodromes yet to be certified through Aerodrome Assistance Go-Team and other appropriate methods as agreed with the States concerned	AP-AA/WG assisted by ACI	Continuous	Aerodrome Assistance Go-Team Methodology Ongoing Under ICAO APAC CAT Mission and COSCAP-Programme
AOP/SG/5 (29 June – 2 July 2021):								
AOP/SG/5/1		Safety, Capacity & Efficiency, ENV	Aerodromes Seminar	Medium	Asia/Pacific Aerodromes Seminar (duration 2 – 3 Days) hosted by States/Industries Theme topic of the Seminar to be proposed by the host in consultation with	States/ Industries (Supported by the Secretariat)	December 2022	Organized Aerodrome Seminar on Airport Master Planning on 29 – 30 June 2023 **[COMPLETED]**

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/6 (27 – 30 June 2022):								
AOP/SG/6/1	Task AP-ADO/TF/3/2	Safety	GRF Seminar	Medium	Organise a GRF Webinar	On behalf of AP-ADO/TF by China (Lead), ACI & ICAO	Q3, 2022	Organized GRF Webinar on 29 Sep. 2022 **[COMPLETED]**
AOP/SG/7 (3 – 6 July 2023):								
AOP/SG/7/1	Task of AP-ADO/TF/4	Safety	Workshop on Aerodrome Pavement Design and Evaluation including ICAO ACR-PCR Method in Reporting Pavement Strength for Asia and Pacific Regions	High	Organize a Workshop on Aerodrome Pavement Design and Evaluation including ACR-PCR Method in Reporting Pavement Strength for Asia and Pacific Regions	Secretariat with FAA support	Q1, 2024	Three days workshop, tentatively the week of 5-9 February 2024. **[COMPLETED]**
AOP/SG/7/2	AOP/SG/7-WP/12	Safety	Strength assessment and classification for grass and unpaved runway	Medium	Assign the task to AP-ADO/TF	AP-ADO/TF	2026	– Conclusion AOP/SG10–4: Asia/Pacific Guidance on Strength Assessment and Classification of Unpaved and Grassed Runway (Appendix XX to AOP/SG/10 Report) **[COMPLETED]**

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/7/3	AOP/SG/7-WP/12	Safety	WP on UAS operations at existing Airports	Medium	Present a WP to share the experiences of Pakistan on UAS operations at existing Airports	Pakistan	~~AOP/SG/10~~ AOP/SG/11	
AOP/SG/8 (15 - 19 July 2024):								
AOP/SG/8/1	Task 5/3 of AP-ADO/TF	Safety	Organize workshops for States and aerodrome operators to share experience in AGA audit area of USOAP CMA especially on alternative means of compliance with AGA related SARPs as advocated for in DGCA/58/DP3/01	High		Pakistan (Lead), Australia, China, India, Secretariat	In conjunction with AOP/SG/9 in July 2025	IP/09 – Maldives IP/12 – Pakistan **[COMPLETED]**
AOP/SG/9 (30 June - 04 July 2025):								
AOP/SG/9/1	Annex 14, Volume I requirement	Safety	Transition from ACN/PCN to ACR/PCR methodology for determination of aerodrome pavement strength	High	Organize workshop on aerodrome pavement design and evaluation incorporating ACR/PCR methodology	ICAO in collaboration with US FAA	February 2026	ICAO Aerodrome Pavement Workshop from 20 to 22 May 2026 in Nadi, Fiji **[COMPLETED]**

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/9/2	CNS SG/29 and SWIM TF/10, ATM/SG~~2~~/12	Capacity and Efficiency	Contribution to the APAC Common SWIM Aeronautical Information services related to AOP field through the APAC Common SWIM Aeronautical Information Services Ad Hoc Group	High	Participate in APAC Common SWIM Aeronautical Information Services Ad Hoc Group Meetings to contribute for finalization of the APAC Common SWIM Aeronautical Information services related to AOP field	India, Japan, Malaysia, Singapore and Thailand	Commence in August 2025 (Ongoing)	Ongoing AOP/SG/10 – WP/07
AOP/SG/9/3	AP-AA/WG/7	Safety	Workshop on Civil/Military Cooperation in Aerodrome Operations/Certification	High	1) Sharing States Experience, Guidance Materials 2) Organize Workshop	Australia, India (Lead), Malaysia	~~2026~~ 2027	
AOP/SG/9/4	AOP/SG/9	Safety	Workshop on RODA	Medium	Workshop in Conjunction with AP-AA/WG/8 inviting AD Operators, IATA, Airlines, IFALPA (TBC)	AP-AA/WG and Secretariat	AP-AA/WG/8	AP-AA/WG/8 –PPT/01 (IATP) AP-AA/WG/8 –PPT/02 (KUNZ GmbH) AP-AA/WG/8 –PPT/03 (RESQTEC) **[COMPLETED]**

Task No.	Ref	Associated ICAO Strategic Objective	Task	Priority	Action Proposed	Action by	Target Date	Status
AOP/SG/10 (10 - 14 August 2026):								
AOP/SG/10/1	AOP/SG/10	Safety	Workshop on safety oversight and safety management of Ground Handling Services	High	1) Sharing States Experience, Guidance Materials 2) Organize Workshop in conjunction with AP-AA/WG/9 or AOP/SG/11	India, Pakistan, Singapore , China (TBC)	2027	

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NOTES ON THE AMENDMENT OF ABOVE TABLE TO ENDORSE AS AOP/SG WORK PROGRAMME

The text of the amendment is arranged to show deleted text with a line through it and new text highlighted with grey shading, as shown below:

~~Text to be deleted is shown with a line through it.~~ text to be deleted

New text to be inserted is highlighted with grey shading. new text to be inserted

~~Text to be deleted is shown with a line through it~~ followed by the replacement text which is highlighted with grey shading. new text to replace existing text

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