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.

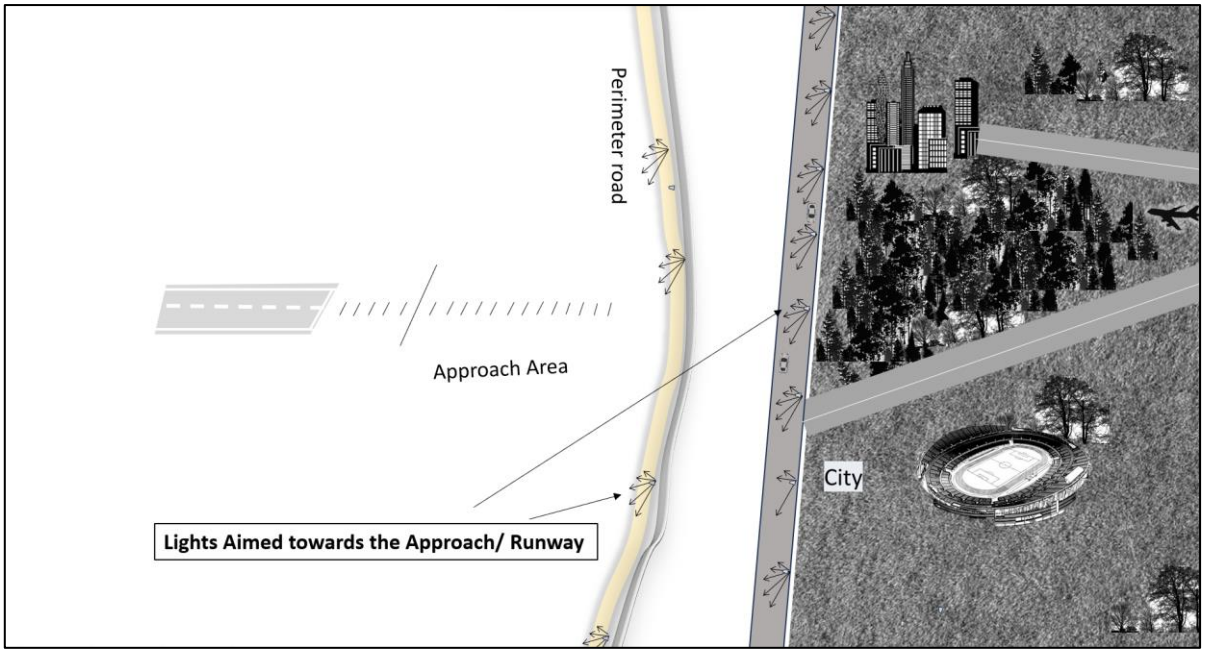


Figure 1. Aiming angle of the road light fixtures in approach area

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).

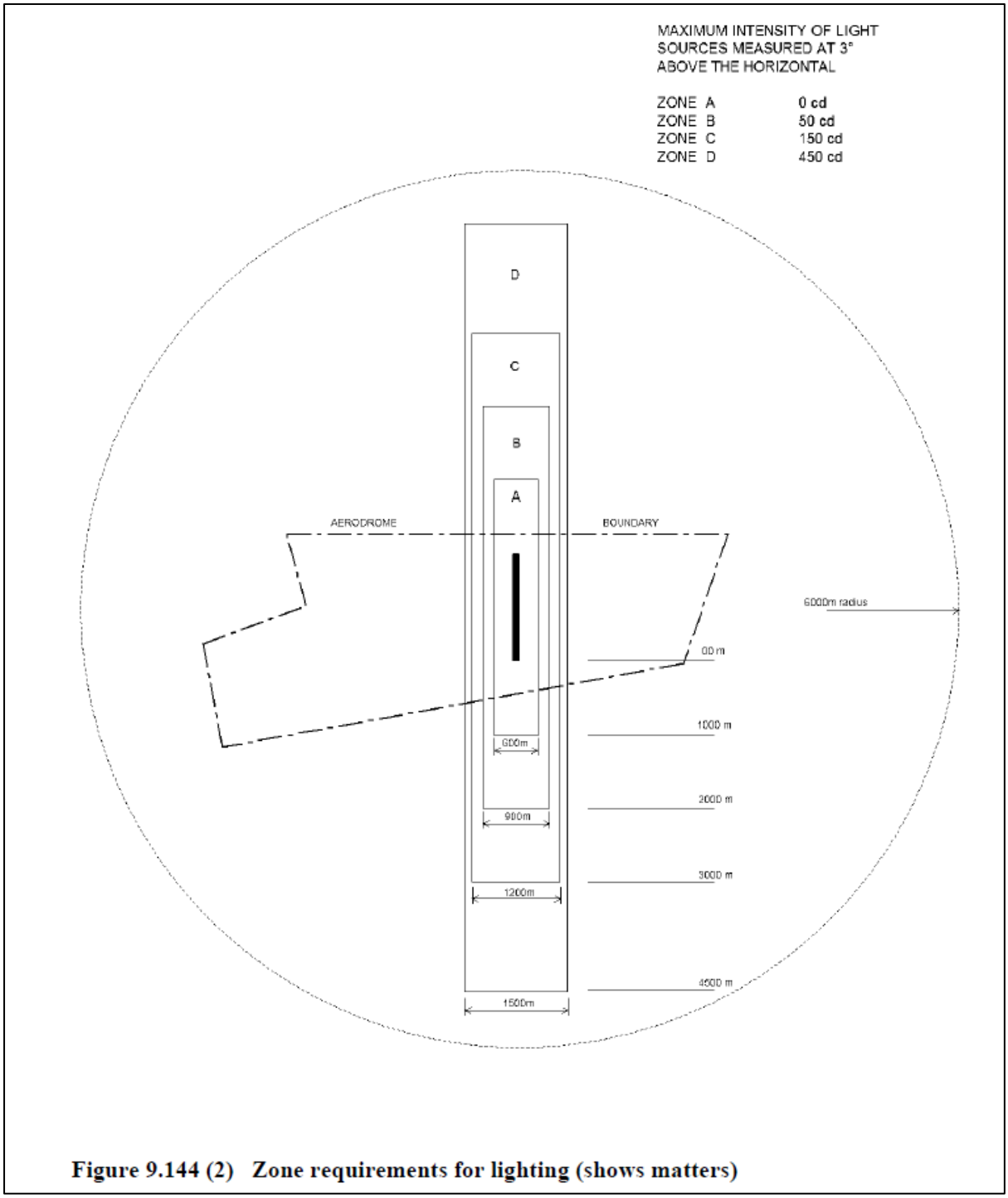


Figure 9.144 (2) Zone requirements for lighting (shows matters)

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.

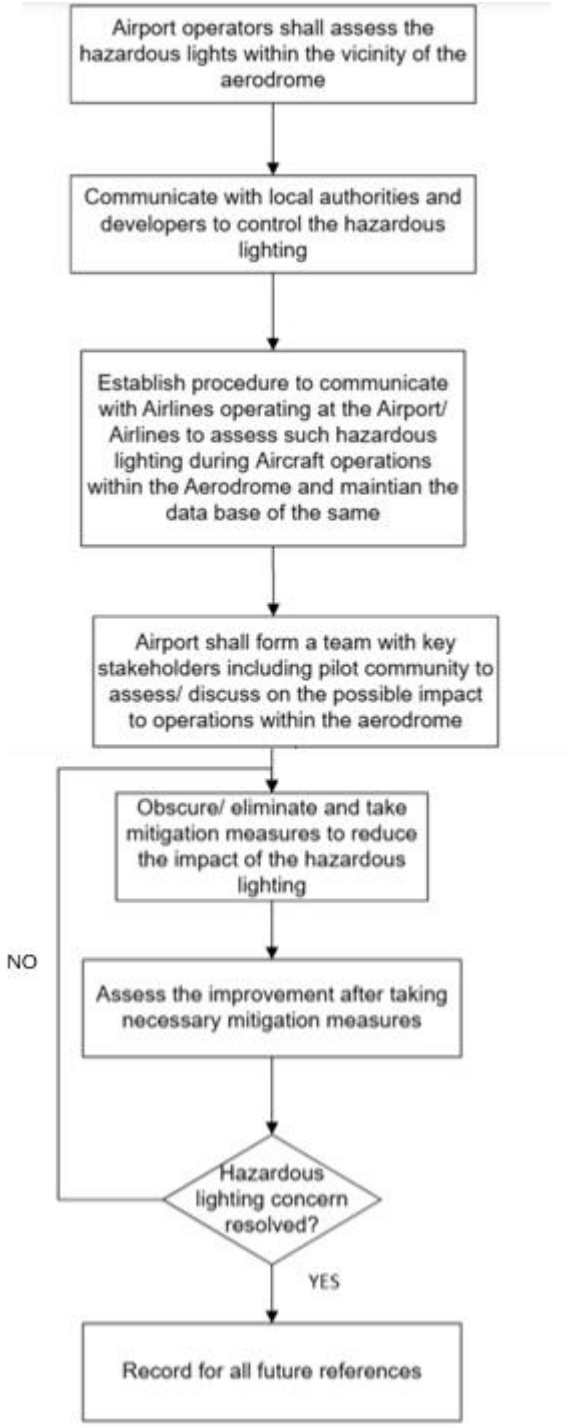
6.2 A well-established approach needs to be developed to assess the lights which are non-aeronautical and possible hazard. Airports need to communicate with local communities and development authorities to ensure the design aspect of ensuring the lights not glaring the Aircraft needs to be taken care 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

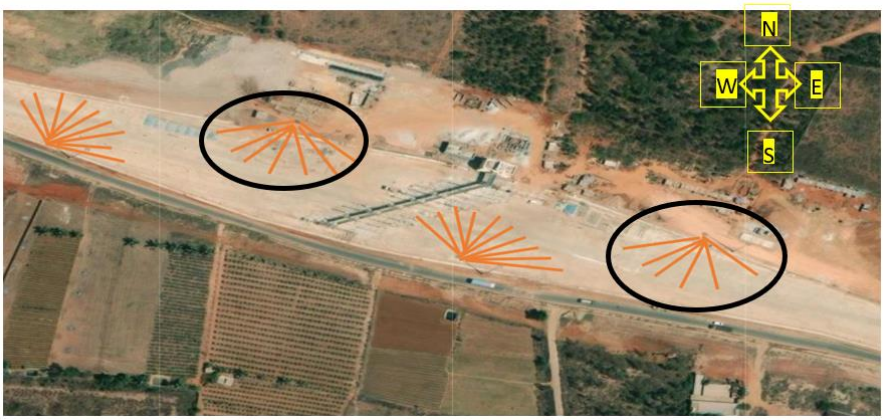
Flight UK 809 (A20N, ALDT: 23:58 Hrs) reported a white light having a glare effect after landing, confirming the persistence and recurrence of the hazard.

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

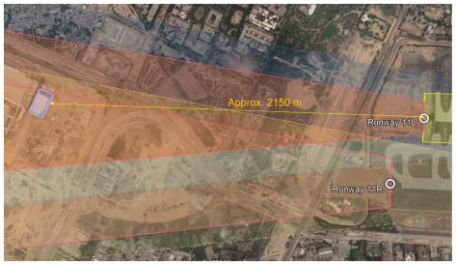
The recurrence of light glare incidents, now affecting multiple flights over three months and confirmed on two separate runways, highlights the extreme urgency of the situation. The inspection on August 8th confirmed that specific, un-lowered high masts, which are now operational, are directed toward 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.

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.

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

AP-ADO/TF TASK LIST
(Updated by AP-ADO/TF/7)

	ACTION ITEM/PLANNED ACTIVITIES	RESPONSIBLE PARTY	TIME FRAME	STATUS	REMARKS
1/1	Identify experts in various AOP fields and maintain a database for the Asia/Pacific Region	States – nomination of experts Secretariat – maintaining database	Continuous	Open	From TOR
1/2	Draft regional guidance for the design and operations of:				From AP-ADO/TF/1 AP-ADO/TF/2 - WP/13
	(a) Altiports	Nepal to lead; assisted by China, Fiji, India and Indonesia	December 2021 Final Draft to be submitted to AOP/SG/8	Completed	Modified in AP-ADO/TF/2 AP-ADO/TF/3-WP/09 - First draft of the GM AP-ADO/TF/4-WP/09 – Second Draft of the GM AP-ADO/TF/5-WP/11 – Third Draft of the GM

	ACTION ITEM/PLANNED ACTIVITIES	RESPONSIBLE PARTY	TIME FRAME	STATUS	REMARKS
1/3	- Study and discuss aerodrome SARPs and guidance materials related to aerodrome planning, design and operations including PANS-Aerodromes; and	States and AP-ADO/TF	Continuous	Ongoing	
	- 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. [Reference: From TOR]	AP-ADO/TF and Secretariat	Continuous	Ongoing	

	ACTION ITEM/PLANNED ACTIVITIES	RESPONSIBLE PARTY	TIME FRAME	STATUS	REMARKS
1/4	- Review and discuss AOP parts of 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. [Reference: From TOR]	AP-ADO/TF States and Secretariat	Continuous Continuous	Ongoing Ongoing	PfAs for four (India, Japan, New Zealand and Sri Lanka States have been completed in 2025. Processing of PfAs submitted by three other States (Australia, Cambodia and China) is in progress.
2/1	Conduct seminars / workshops for aerodrome regulatory and aerodrome operator staff in APAC Region		Continuous	Ongoing	Conducted GRF Webinars in 2021 in coordination with: – FTF, ACI, IFALPA, IFATCA and IFAIMA – Japan incorporating winter operations OLS Workshop conducted in Sep 2025
3/1	Technical assistance/Workshop for APAC States that have yet to implement GRF	United States FAA (upon request and on case by case basis)	Continuous	Ongoing	Nil request received from States

	ACTION ITEM/PLANNED ACTIVITIES	RESPONSIBLE PARTY	TIME FRAME	STATUS	REMARKS
3/2	GRF Seminar	China (Lead), ACI & ICAO	Q3, 2022	Completed	Seminar on GRF - *Ten Months into GRF, Challenges Met and Lessons Learnt in Asia-Pacific* conducted by ICAO jointly with China and ACI on 29 Sep. 2022
AP-ADO/TF/4					
4/1	Workshop on Aerodrome Pavement Design and Evaluation including ICAO ACR-PCR Method in Reporting Pavement Strength for Asia and Pacific Regions	With FAA support and Secretariat	Q1, 2024	Completed	Aerodrome Pavement Workshop conducted from 7 to 9 Feb. 2024
AP-ADO/TF/5					
5/1	Develop Regional guidance material on the transposition of Annex 14 ICAO SARPs	**Malaysia** (Lead), ROK, Nepal, PNG, Australia, Thailand & ACI,	By November 2024	Completed	Submitted the draft Guidance Material on the Transposition of Annex 14 SARPs with AP-ADO/TF/6-**WP/17** for endorsement by the Task Force.
5/2	Organize workshops on the transposition of Annex 14 SARPs into National Standards	**Malaysia** (Lead), ACI and Secretariat	In conjunction with AP-ADO/TF/6 in Jan/Feb 2025	Completed	Workshop was conducted on 17 February 2025.
5/3	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	**Pakistan** (Lead – TBC by AOP/SG/8), Australia, China (TBC by AOP/SG/8), India, Secretariat	In conjunction with AOP/SG/9 in July 2025	Completed	Vietnam shared their experience at AOP/SG/8. China shared at AP-ADO/TF/6.

	ACTION ITEM/PLANNED ACTIVITIES	RESPONSIBLE PARTY	TIME FRAME	STATUS	REMARKS
5/4	Regional Guidance on Risk Assessment for Lights with the Hazardous Effects	**India** (Lead), ROK, Nepal, Thailand	Dec 2026	Ongoing	AP-ADO/TF/6 - WP/16 AP-ADO/TF/7 - WP/07
5/5	Regional Guidance for Strength assessment and classification for grass and unpaved runway [Task 7/2 from AOP/SG/7]	**PNG** (Lead), Nepal, Australia	Dec 2025	Ongoing	The First Draft was submitted to AP-ADO/TF/6 for review and comments along with WP/18 AP-ADO/TF/7 - WP/08
AP-ADO/TF/6					
6/1	Conduct research and analysis to develop measurable conspicuity standards for runway and taxiway markings to provide aerodrome operators and regulators with clear, objective criteria for evaluating marking effectiveness	Malaysia (Lead), India, Thailand, Vietnam and ACI	Dec 2027	Ongoing	AP-ADO/TF/7 - WP/09
6/2	Develop a regional guidance on the assessment and mitigation of glare and glint from solar panels installed at or in the vicinity of the aerodrome	Malaysia (Lead), India, Philippines and Sri Lanka	Dec 2027	Ongoing	AP-ADO/TF/7 - WP/15
6/3	Develop a generic guidance for circumstances/situation where the phrase "**as far as practicable and/or wherever practicable**" would be needed for flexibility of the implementation of SARPs based on experiences and best practices of APAC States from different geographical regions.	Nepal (Lead), Australia, Malaysia, Wellington Airport (New Zealand), Pakistan	Dec 2027	Ongoing	AP-ADO/TF/7 - WP/16

	ACTION ITEM/PLANNED ACTIVITIES	RESPONSIBLE PARTY	TIME FRAME	STATUS	REMARKS
6/4	Develop regional guidance to provide interrelationship between ICAO Annex 10 Volume I, ICAO Annex 14 volume I and Aerodrome Design Manual (DOC. 9157) Part 6 for visual and non-visual aids installation on runway and taxiway strips and RESA (Action by the meeting proposed by WP/12 refers)	Nepal (Lead), Fiji (TBC), India, China (TBC)	Dec 2027	Ongoing	AP-ADO/TF/7 - WP/17
AP-ADO/TF/7					
7/1	Conduct further study and analysis of the Intersection Take Off Holding Position Indicator Concept proposed by India (Action by the meeting proposed by WP/10 refers)	India (Lead), Malaysia, Pakistan, IFALPA, China (TBC)	AP-ADO/WG/8	Feb 2027	AP-ADO/TF/7 - WP/10
7/2					

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.