Guidance Material
Non-Aeronautical Light Assessment Around Aerodromes
34 GM-07

March 2026

Table of Contents

FORWARD **3**
REFERENCES **3**
GLOSSARY **4**
1.1 Irradiance 4
1.2 Laser 4
1.3 Maximum Permissible Exposure (MPE) 4
1.4 Protected Flight Zones 4
GENERAL **5**
LASER-BEAM FREE FLIGHT ZONE (LFFZ) 7
LASER-BEAM CRITICAL FLIGHT ZONE (LCFZ) 7
LASER-BEAM SENSITIVE FLIGHT ZONE (LSFZ) 7
NORMAL FLIGHT ZONE (NFZ) 7
LASERS 8
CORRECTIVE ACTION **8**
6.1 Action by Aerodrome operator 8
6.2 Action by Jordan Civil Aviation Regulatory Commission (CARC) 9

FORWARD

Jordan as a Contracting State to the Convention on International Civil Aviation has an obligation to the international community to ensure that civil aviation activities under its jurisdiction are carried out in strict compliance with the Standards and Recommended Practices contained in the nineteenth Annexes to the Convention on International Civil Aviation in order to maintain the required aviation standards.

An aerodrome operator, which requires having a non-aeronautical ground light near an aerodrome, which might endanger the safety of aircraft to be extinguished, screened or otherwise modified so as to eliminate the source of danger.

This guidance material provides guidance to aerodrome operators to monitor and properly shield a non-aeronautical ground light or Laser emitter near the aerodrome, which may endanger the safety of aircraft.

REFERENCES

- JCAR Part (139) –Aerodrome Design and Operations.
- JCAR Part (14) – Aerodrome Design and Operations.
- JCAR Part (77) _ Objects Affecting Navigable Airspace.
- Manual on Laser Emitters and Flight Safety (ICAO Doc 9815).

Captain Daifallah Alfarajat

Chief Commissioner

GLOSSARY

1.1 Irradiance

The power per unit area expressed in watts per square centimeter (W/cm^2).

Small value may be expressed as micro-watts per square centimeter ($\mu W/cm^2$) or Nano-watts per square centimeter (nW/cm^2).

1.2 Laser

An acronym for light amplification by stimulated emission of radiation.

A device that produce an intense, coherent, directional beam of optical radiation by stimulating emission of photons by electronic or molecular transition to lower energy level.

1.3 Maximum Permissible Exposure (MPE)

The internationally accepted maximum level of laser radiation to which human beings may be exposed without risk of biological damage to the eye or skin.

1.4 Protected Flight Zones

Airspace specifically designated to mitigate the hazardous effects of laser radiation.

(a) Laser-beam critical flight zone (LCFZ)

Airspace in the proximity of an aerodrome but beyond the laser-beam free flight zone (LFFZ) where the irradiance is restricted to a level unlikely to cause glare effects.

(b) Laser-beam free flight zone (LFFZ)

Airspace in the immediate proximity to the aerodrome where the irradiance is restricted to a level unlikely to cause any visual disruption.

(c) Laser-beam sensitive flight zone (LSFZ)

Airspace outside, and not necessarily contiguous with, the LFFZ and LCFZ where the irradiance is restricted to a level unlikely to cause flash-blindness or after-image effects.

(d) Normal flight zone (NFZ)

Airspace not defined as LFFZ, LCFZ or LSFZ but which must be protected from laser radiation capable of causing biological damage to the eye.

GENERAL

2. 1 Lasers can produce a beam of light of such intensity that can cause permanent damage to human tissue, in particular the retina of the eye, can be caused instantaneously, even at distances of over 10 km. At lower intensities, laser beams can seriously affect visual performance without causing physical damage to the eyes.

2. 2 Protection of pilots against accidental laser beam strike has become a serious factor in aviation safety with the advent of the laser light display for entertainment or commercial purposes.

2. 3 To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones should be established around aerodromes:

(a) A laser-beam free flight zone (LFFZ),

(b) A laser-beam critical flight zone (LCFZ), and

(c) A laser-beam sensitive flight zone (LSFZ).

2. 4 Figures 1, 2, and 3 may be used to determine the exposure levels and distances that adequately protect flight operations.

2. 5 The restrictions on the use of laser beams in the three protected flight zones, LFFZ, LCFZ, and LSFZ, refer to visible laser beams only

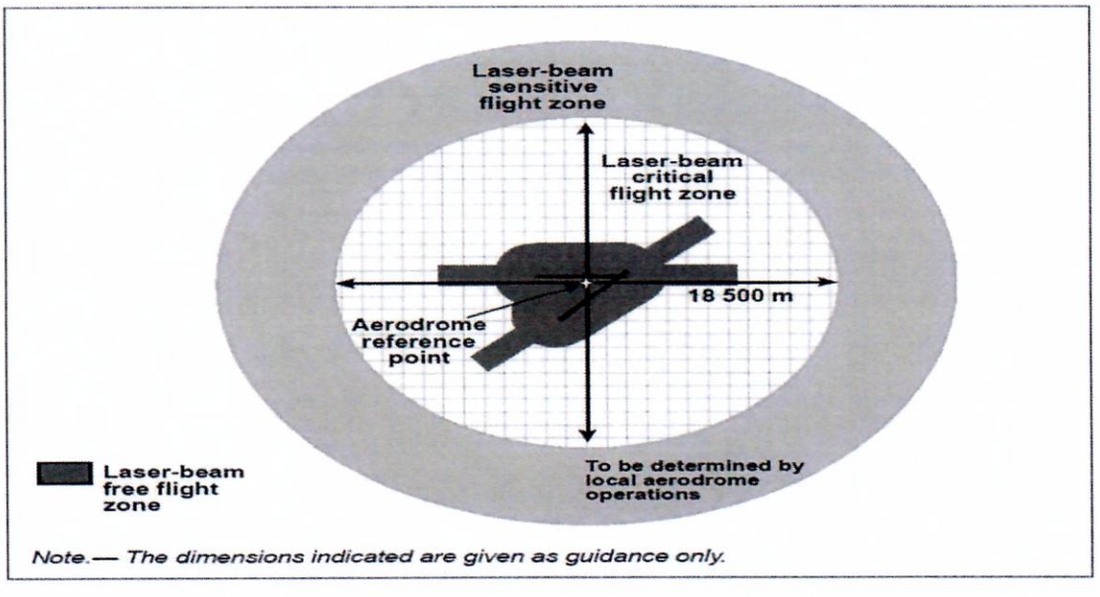

Figure 1. Protected flight zones

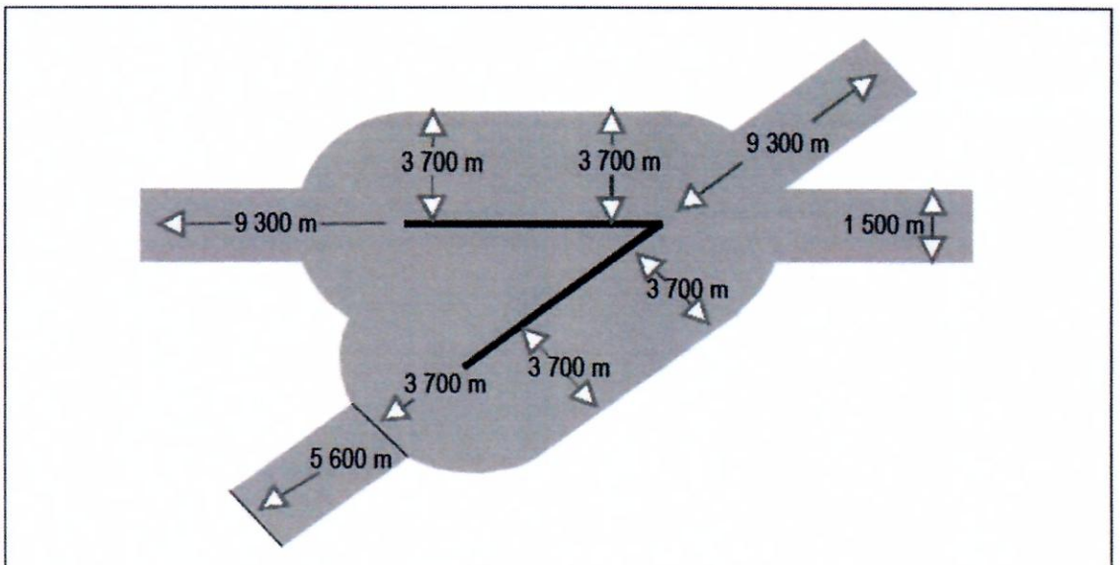

Figure 2. Multiple runway laser-beam free flight zones

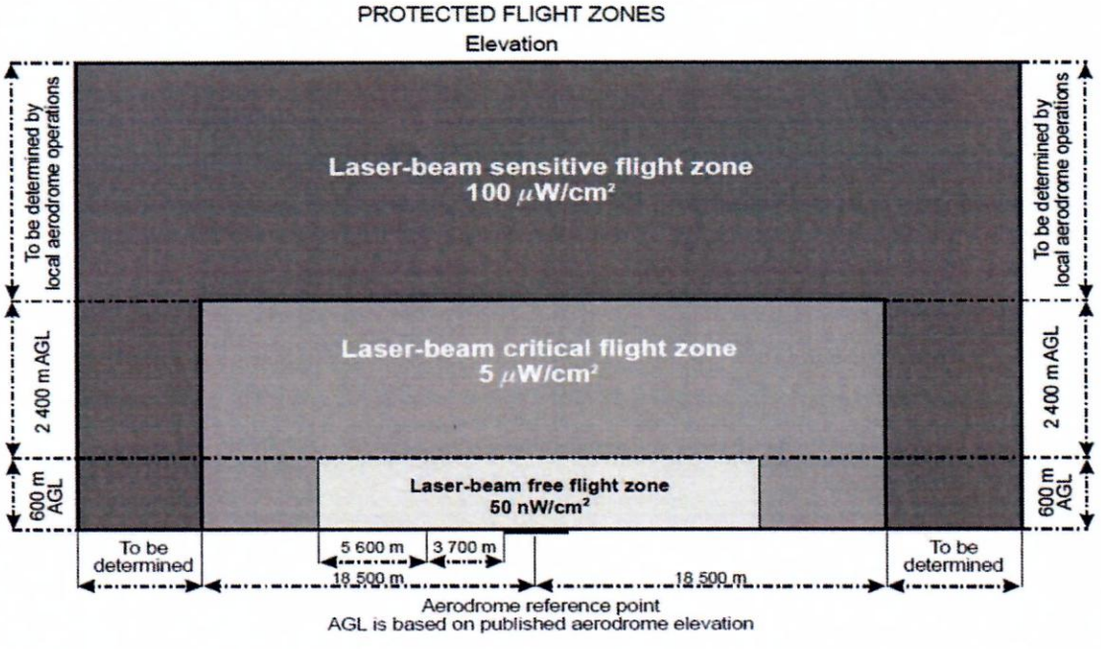

Figure 3. Protected flight zones with indication of maximum

Irradiance levels for visible laser beams

2. 6 Laser emitters operated by authorities in a manner compatible with flight safety are excluded from these restrictions. Typical examples of lasers used to support aviation include some cloud base or visibility measurement equipment, some bird harassing devices, and some aircraft docking guidance systems. Aerodrome authorities are to ensure that these lasers have the beam aimed in such a direction, and/or that the times of operation are controlled, to ensure no hazard is posed to aircraft operations.

2. 7 In all navigable air space, the irradiance level of any laser beam, visible or invisible, is expected to be less than or equal to the maximum permissible exposure (MPE) unless such emission has been notified to the authority and permission obtained.

2. 8 The protected flight zones are established in order to mitigate the risk of operating laser emitters in the vicinity of aerodromes.

2. 9 The dimensions indicated for the various zones are given as guidance.

LASER-BEAM FREE FLIGHT ZONE (LFFZ)

3. 1 Within this zone, the intensity of laser light should be restricted to a level that is unlikely to cause any visual disruption. The irradiance should not exceed 50nW/cm2 unless some form of mitigation is applied. The level of brightness thus produced is indistinguishable from background ambient light.

LASER-BEAM CRITICAL FLIGHT ZONE (LCFZ)

4. 1 While the suggested extent of this zone is shown in the Figures, this zone may have to be adjusted to meet air traffic requirements.

4. 2 Within this zone the irradiance should not exceed 5μW/cm^2 unless some form of mitigation is applied. Although capable of causing glare effects, this irradiance will not produce a level of brightness sufficient to cause flash-blindness or after-image effects.

LASER-BEAM SENSITIVE FLIGHT ZONE (LSFZ)

5. 1 The extent of this zone should be determined by the operations at the particular aerodrome. The LSFZ need not necessarily be contiguous with the other flight zones.

5. 2 Within this zone, the irradiance should not exceed 100μW/cm2 unless some form of mitigation is applied. The level of brightness thus produced may begin to produce flash-blindness or after-image effects of short duration; however, this limit will provide protection from serious effects.

NORMAL FLIGHT ZONE (NFZ)

6. 1 The NFZ is any navigable airspace not defined as LFFZ, LCFZ or LSFZ. The NFZ should be protected from laser radiation capable of causing biological damage to the eye.

6. 2 The maximum irradiance level (MIL), should be equal to or less than the maximum permissible exposure (MPE).

LASERS

7. 1 Lasers used in the vicinity of aerodromes add to the known aviation-related problems associated with high intensity lights and can have a physiological impact upon pilots which could threaten aircraft safety, particularly at critical stages of flight such as final approach. Such physiological effects can include: glare, temporary flash blindness, after-image, and, possibly, eye injury. In addition, there is the potential for laser activity to dazzle and distract pilots of aircraft, and any planned laser activity must be organized to avoid this eventuality.

7. 2 Protection of the pilot against deliberate or accidental laser beam strikes has increased the risk of accidental illumination of aircraft from such displays, and therefore it is increasingly important to manage and mitigate those risks.

CORRECTIVE ACTION

6.1 Action by Aerodrome operator

(a) Include 'Non-aeronautical ground lights or LASER Emitter near the aerodrome' in the 'Daily Checklist of Airport Lighting Condition Report' form, and amend the Aerodrome Manual accordingly.

(b) During daily inspection of the aeronautical ground lights, the personnel shall also observe whether there is any non-aeronautical ground light or a LASER emitter near the aerodrome, which may endanger the safety of aircraft, and make entry in the Reports.

(c) Whenever any pilot reports Air Traffic Controllers about such hazardous light(s) , Air Traffic Controller shall raise a report to the airport operator.

(d) On getting such report(s), Aerodrome Operator shall take actions to extinguish, shield or otherwise modify the hazardous lights.

(e) If required, Aerodrome Operator will take help of local administration.

(f) If the Aerodrome operator is unable to solve the problem, report of such hazardous lights shall be forwarded to CARC Chief Commissioner CEO, within 3 working days of raising the report.

(g) If asked by CARC CEO to raise formal complaint against the owner / operator of the hazardous non-aeronautical light and / or LASER emitter in the local administration, the Aerodrome operator shall take immediate action on that, and shall follow up, as required.

(h) Aerodrome operator shall keep AOD Director informed regularly.

6.2 Action by Jordan Civil Aviation Regulatory Commission (CARC)

(a) If the owner / operator of the light does not take appropriate action, CARC may cause a notice to be served upon the owner of the place where the light is exhibited or upon the person having charge of the light directing the owner or person, within a reasonable time to be specified in the notice, to extinguish or to shield effectually the light in the manner specified in such notice.

(b) In case the above actions fail, CARC shall ask the Aerodrome operator to raise formal complaint in the local administration against the owner / operator of the hazardous non- aeronautical light and / or LASER emitter.