



International Civil Aviation Organization

Runway and Ground Safety Working Group

Fourth Meeting (RGS WG/4)
(Cairo, Egypt, 05-07 November 2017)

Agenda Item 2: Global and Regional Development related to RGS

OUTCOME OF THE RASG-MID/6 MEETING

(Presented by the Secretariat)

SUMMARY

This paper presents the outcome of RASG-MID/6 meeting.

Action by the meeting is at paragraph 3.

1. INTRODUCTION

1.1 The Sixth meeting of the Regional Aviation Safety Group – Middle East (RASG-MID/6) was hosted by Bahrain Civil Aviation Affairs, at the Movenpick Hotel in Bahrain, 26 – 28 September 2017.

1.2 The meeting was attended by a total of sixty (60) participants from eleven (11) States (Bahrain, Egypt, Iraq, Jordan, Kuwait, Oman, Saudi Arabia, Sudan, Turkey, UAE and United States) and seven (7) International Organizations/Industries (ACI, Airbus, CANSO, EMBRAER, IATA, IFATCA and MIDRMA).

2. DISCUSSION

2.1 The Sixth RASG-MID meeting endorsed sixteen (16) Conclusions and Decisions out of them eight (8) are related to RGS as at **Appendix A**.

2.2 The RASG-MID/6 meeting recalled that the progress made by ICAO to support the implementation of SSP and SMS, as a follow up to Amendment 1 to Annex 19, which will become applicable on 7 November 2017. This included the following points:

- a. a revision to the *Safety Management Manual (SMM)* (Doc 9859);
- b. the development of an ICAO Safety Management Implementation website with examples to complement the SMM;
- c. updated SSP tools;
- d. an update to the ICAO Safety Management Training Programme; and
- e. ICAO SSP implementation promotional activities.

2.3 With respect to safety recommendations related to past investigation activities, which could be very beneficial to address the Focus Areas and Emerging Risks in the MID Region, RASG-MID/6 urged States to share their safety recommendations after the completion of investigation

2.4 With regard to the Ground Handling operations, which are considered as a source of significant personnel safety and aircraft/equipment damage concerns, the RASG-MID/6 agreed that the complexity of ground handling operations has increased with widespread airport development and traffic growth, corresponding to larger numbers and size of aircraft. RASG-MID/6 invited:

ICAO to consider:

- a) the development of additional Ground Handling Operations provisions; and
- b) the expansion of the ICAO Runway Safety Programme (RSP) scope to include the movement area (including aprons)

MID States to:

- a) encourage airlines and aerodrome operators to implement the procedures contained in the IATA Ground Operations Manual (IGOM) for harmonization purpose and to improve safety of Ground Handling Operations; and
- b) use the IATA Safety Audit for Ground Operations (ISAGO) as a source of safety data which provide complementary information for the safety oversight activities of ground handling operations services.

2.5 The meeting may wish to note that IATA was the Champion for developing an SEI on Ground Handling Operations, however IATA won't be able to get this task completed in the near future. The meeting is invited to explore and decide on this SEI development.

2.6 Based on RASG-MID Decisions 6/12 & 16/13, the ICAO MID Regional Office issued:

- a) RSA-13 on "*Wildlife Hazards Management and Control*" by State Letter Ref.: ME 4-17/ 292 dated 23 October 2017 at **Appendix B**; and
- b) Revised RSA-12 on "*Laser Attack Safety Guidelines*" by State Letter Ref.: ME 4-4/291 dated 23 October 2017 at **Appendix C**.

2.7 With respect to the Procedures for the Air Navigation Services – Aerodromes (PANS-Aerodromes – Doc 9981), the meeting urged States and aerodrome operators to implement the provisions of the PANS-Aerodromes and to publish up-to-date lists of significant differences from this document in their AIP. The meeting urged States to attend the ICAO Seminar/Workshop on the implementation of PANS-Aerodromes that will be held in Cairo, Egypt, 8-9 November 2017, back-to-back with the RGS WG/4 meeting.

2.8 RASG-MID/6 noted with appreciation that:

- a) Egypt will host the Aerodrome Safeguarding Workshop in Cairo, Egypt, (4-6 December 2017). Accordingly, the meeting encouraged States and stakeholders to participate in this Workshop.
- b) Sudan offered to host a Workshop on the Wildlife Management Control in September 2018.

2.9 RASG-MID/6 reviewed the revised version of MID Region Safety Strategy that was supported by the RSC/5 meeting to reflect the GASP 2017-2019 including its Roadmap, as well as the agreed Safety Targets. The revised version of the Strategy is at **IP/3**.

2.10 The full Report on RASG-MID/6 is available on ICAO MID website on <http://www.icao.int/MID/Pages/meetings.aspx>.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the outcome of the RASG-MID/6 and take actions related to RGS, as appropriate.

APPENDIX A

RASG-MID/6 CONCLUSIONS AND DECISIONS

CONCLUSIONS AND DECISIONS
<p>CONCLUSION 6/2: SAFETY MANAGEMENT IMPLEMENTATION</p> <p><i>That States, regional and international organizations are invited to share tools and examples, which support effective safety management implementation, to be considered for posting on the ICAO safety management implementation website.</i></p>
<p>CONCLUSION 6/4: SHARING OF SAFETY RECOMMENDATIONS</p> <p><i>That,</i></p> <ul style="list-style-type: none">a) <i>States be urged to share their Safety Recommendations after investigation of accidents and incidents; and</i>b) <i>MID-SST to coordinate with MID-ASRT, ICAO and stakeholders the development of a RASG-MID Safety Advisory to consolidate a set of safety recommendations addressing the Focus Areas and Emerging Risks in the MID Region.</i>
<p>CONCLUSION 6/5: ADOPTION OF ISAGO AND IGOM FOR GROUND HANDLING OPERATIONS</p> <p><i>That, States be invited to:</i></p> <ul style="list-style-type: none">a) <i>encourage airlines and aerodrome operators to implement the procedures contained in the IATA Ground Operations Manual (IGOM) for harmonization purpose and to improve safety of Ground Handling Operations; and</i>b) <i>use the IATA Safety Audit for Ground Operations (ISAGO) as a source of safety data which provide complementary information for the safety oversight activities of ground handling operations services.</i>
<p>CONCLUSION 6/6: DEVELOPMENT OF ADDITIONAL GROUND HANDLING OPERATIONS PROVISIONS</p> <p><i>That, ICAO be invited to consider the development of additional Ground Handling Operations provisions.</i></p>
<p>CONCLUSION 6/7: EXPANSION OF THE RSP SCOPE</p> <p><i>That, ICAO be invited to consider the expansion of the ICAO Runway Safety Programme (RSP) scope to include the movement area (including aprons).</i></p>
<p>DECISION 6/12: RASG-MID SAFETY ADVISORY - WILDLIFE MANAGEMENT AND CONTROL</p> <p><i>That, the RASG-MID Safety Advisory (RSA/13) on Wildlife Management and Control at Appendix 3I is endorsed and be published by the ICAO MID Office.</i></p>

CONCLUSIONS AND DECISIONS	
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DECISION 6/13:	AMENDED RASG-MID SAFETY ADVISORY/12 – LASER ATTACK SAFETY GUIDELINES
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That, the revised version of the RASG-MID Safety Advisory (RSA/12) on Laser Attacks at Appendix 3J is endorsed and be published by the ICAO MID Office.

CONCLUSION 6/14:	REVISED MID REGION SAFETY STRATEGY
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*That, the revised version of the MID Region Safety Strategy at **Appendix 3N** is endorsed (IP/3)*

APPENDIX B

RASG-MID SAFETY ADVISORY – 12
(RSA-12)



Revision 1 – September 2017

MID-Region

LASER Attacks Safety Guidelines

Date of Issue:	March 2017
Revision:	No. 1 dated September 2017
Document Ref. No.:	RASG-MID/MIDRAST/RGS/SEI/06
Owner:	RASG-MID

These guidelines are developed by the LASER Attacks team - Runway and Ground Safety Working Group (RGS WG), as part of MID-RAST/RGS/6 DIP deliverables, based on the work of the Egyptian Civil Aviation Authority in collaboration with the ICAO MID Regional Office.

Disclaimer

This document has been compiled by members of the aviation industry to provide guidance for civil aviation regulators, aerodrome operators and other stakeholders in order to enhance aviation safety. It is not intended to supersede or replace existing materials produced by the States national regulators or in ICAO SARPs. The publication of this document does not prejudice the National Regulator's ability to enforce existing national regulations. To the extent of any inconsistency between this document and the National/International regulations, standards, recommendations or advisory publications, the content of the National/International regulations, standards, recommendations and advisory publications shall prevail.

Regional Safety Advisory

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INTRODUCTION

PURPOSE

This Guidance Material provides general information and advice on measures to protect pilots of civil aircraft from accidental laser beam strikes, on or in the vicinity of an aerodrome. This guidance should be used in the planning and control of advertising, entertainment, and similar visual displays using visible laser light. This Guidance Material is unlikely to prevent willful laser attacks against aircraft, but it is the intension of using it as a control tool for malicious laser attacks.

It should be of interest to air Traffic controllers, aerodrome operators, and to the operators of laser shows. It may also be of interest to pilots and airlines.

GLOSSARY

Irradiance (E):

The power per unit area expressed in watts per square centimeter (W/cm^2) or watts per square meter (W/m^2). Small values may be expressed as micro (10^{-6}) watts per square centimeter ($\mu\text{W}/\text{cm}^2$) or nano (10^{-9}) watts per square centimeter (nW/cm^2).

Laser:

- 1) An acronym for light amplification by stimulated emission of radiation.
- 2) A device that produces an intense, coherent, directional beam of optical radiation by stimulating emission of photons by electronic or molecular transition to lower energy levels.

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.

Protected Flight Zones:

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

GENERAL

The development of the laser and the industrial application of laser technology stand out as some of the most significant scientific contributions of the 20th century. Presently, lasers are found virtually everywhere, from supermarkets and schools to satellites and operating rooms.

However, if used improperly, laser energy also poses a significant biohazard. Consequently, even the most innocuous laser pointer can become a safety hazard, either through direct bio-effects or by causing a disruption of critical performance tasks in hazardous situations.

Lasers can produce a beam of light of such intensity that 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.

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.

Chapter 1

REGULATORY

The need of provisions which establishes and enforces regulations for commercially available laser devices based on safe exposure criteria derived from current medical knowledge is highly considered.

First, lasers fall into five general categories: (the higher the class number, the greater the hazard) Class I, Class II, Class IIIa, Class IIIb, and Class IV. Class I includes devices, such as laser printers and DVD players, that have enclosed lasers designed to prevent the escape of any harmful radiation. Class II lasers emit visible light and are considered too bright to view for extended periods, but momentary viewing is not considered hazardous. Class IIIa devices are hazardous if the beam is viewed directly, but cannot produce a reflected beam hazard unless viewed for extended periods at close range. Most commonly available laser devices, such as laser pointers and laser levels, are either Class II or Class IIIa devices.

Furthermore, although not manufactured for use as “legal” laser pointers, some Class IIIb lasers packaged as laser pointers can be purchased over the Internet. Momentary exposure to a Class IIIb laser can cause eye damage. More powerful Class IV lasers used in research, medical, industrial, and military applications can pose fire hazards, damage skin, and can cause significant eye damage even when viewed indirectly. Various safety precautions, including eye protection, are needed when working around these devices. While not widely available, these powerful lasers could potentially be used as a terrorist weapon to attempt to incapacitate a flight crew.

Most of the recent laser incidents may be attributable to the increasing availability and reduced cost of green laser pointers. Green lasers pose particular hazards to pilots because they are perceived to be about 35 times brighter than equivalently powered red lasers due to the fact that humans are so much more sensitive to green light.

One policy option that may be considered, is whether to apply different standards for laser output based on the color (wavelength) emitted by the device. Another option is to restrict the sale or establish tighter controls on the use of certain laser devices, i.e.: restricted sales of Class IIIa laser pointer devices in response to several incidents involving lasers directed at aircraft (it can be expressed in terms of power).

The Civil Aviation Authority has the right to adopt all protective measures required to prevent the committing of acts and offences against the safety and security of civil aviation, or on board aircraft of the national carrier, in accordance with the relevant international rules

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).

Geographical Identification of Hazard From Aerodrome Reference Point
Free Zone : Within 3 Nautical Miles (5.5 kilometers)
Critical Zone: within 10 Nautical Miles (18.5 kilometers) radius of the Extended Runway Centerline.
Sensitive Zone : beyond than 10 NM
NOTE : 1- If this is not possible, then the light display may represent a threat to flight safety and should not proceed. 2- Aerial fireworks displays should be limited to a height of 1500 ft above ground level.

ICAO Annex 14 figures, as shown below, may be used to determine the exposure levels and distances that adequately protect flight operations.

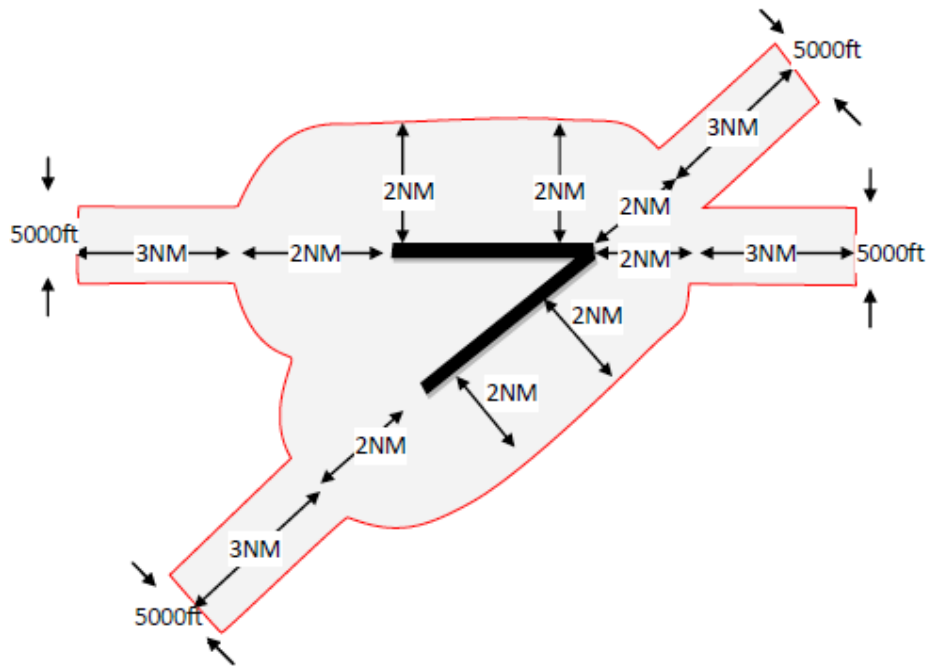


Figure 1: Multiple Runways LFFZ

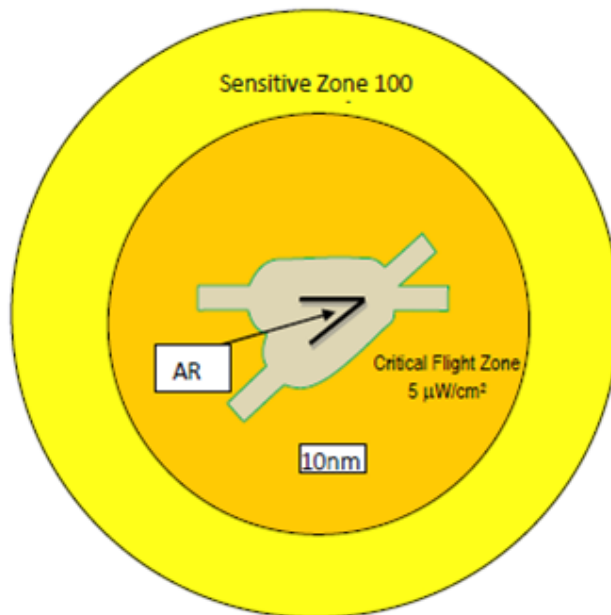


Figure 2: Multiple Runways LCFZ

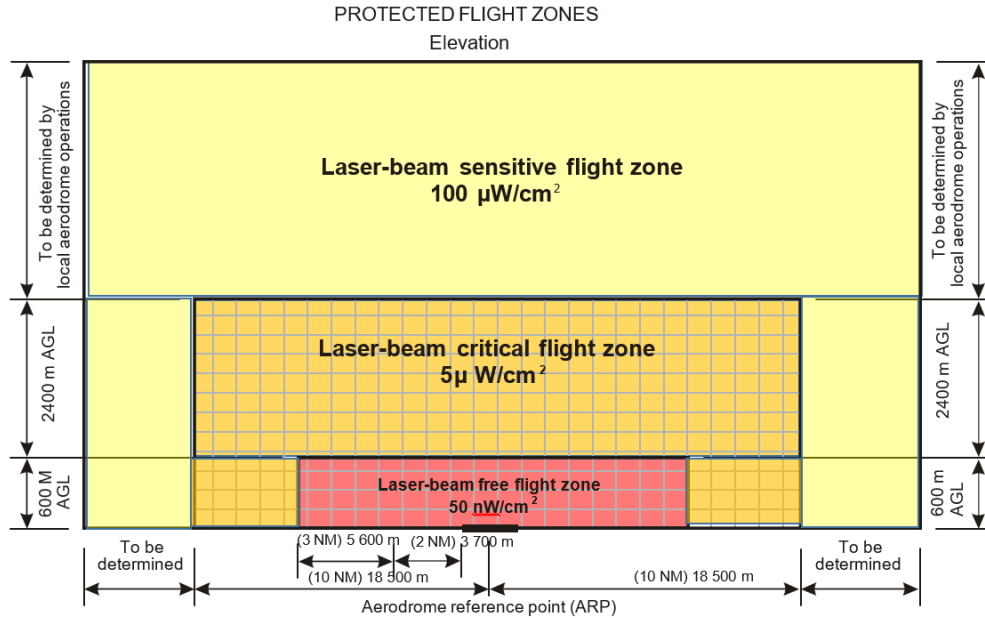


Figure 3: Maximum Irradiance Levels

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

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.

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.

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

The dimensions indicated for the various zones are given as guidance, but ICAO Doc 9815 advises that they have been found to provide for the safe operation of aircraft in the vicinity of aerodromes.

Laser-Beam Free Flight Zone

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 50 nW/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

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

Within this zone the irradiance should not exceed $5 \mu\text{W}/\text{cm}^2$ 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

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.

Within this zone the irradiance should not exceed $100 \mu\text{W}/\text{cm}^2$ 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

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.

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

Chapter 2

HAZARD

The red laser pointer commonly seen in classrooms and conference venues are low-powered devices of less than one milliwatt (mW). These are normally with insufficient power to cause actual physical harm, although they still require care in their operation and use.

Green laser pointers are readily available with a maximum power rating of 5 mW, and are classified as more hazardous. The eye's maximum sensitivity to visible light is around the wavelength of a green laser, and the eye will interpret a green laser light of a given power as being up to 30 times brighter than a red laser of the same power. Direct eye exposure to a green laser beam can result in temporary visual impairment.

Some effort would be required to inflict actual eye damage with a 5 mW green laser pointer as both the low power and the eye's natural defense (blinking reflex) would combine to limit potential damage. However, some vendors are now advertising higher-powered (from 10 to 400 mW) green laser pointers which are definitely harmful, and can cause permanent eye damage.

The severity and duration of the vision impairment varies significantly, depending on the intensity and wavelength of the light, the individual's current state of light (or dark) adaptation, and even the person's skin pigmentation (eye colour). The effects of exposure to a laser beam include:

Distraction: The dazzling effect on the eye can be a major distraction, particularly in situations of high workload (e.g. take-off, approach, and landing).

Temporary Visual Impairment: Adverse visual effects that include: glare (a temporary disruption in vision caused by bright light within an individual's field of vision); flash-blindness (the inability to see, caused by bright light entering the eye) that persists after the illumination has ceased; and after-image (an image that remains in the visual field after exposure to a bright light).

Eye Injury: Temporary or permanent damage to the eye caused by exposure to laser light. Normally the result of direct exposure to prolonged or high power laser light.

Laser illumination of aircraft can cause distraction, disorientation, and discomfort for pilots resulting in a potentially hazardous situation during critical phases of flight.

Chapter 3

ROLE OF AVIATION KEY PLAYERS

Airline

The time and place of an unauthorized illumination of an aircraft by a laser is difficult to predict, although there is evidence that aircraft operating in certain locations, particularly around aerodromes, are increasingly likely to be subject to unauthorized illumination. Whenever practicable, flights within areas of recently reported laser or bright light activity should be avoided. Pilots operating in controlled airspace should obtain an ATC clearance before deviating from their cleared flight path, having first dealt with their immediate safety.

Pre-flight Procedures:

- Notices to airmen (NOTAMs) should be consulted for location and operating times of laser activates and alternate routes should be considered.
- Aeronautical charts should be consulted for permanent laser activities (theme parks, research facilities, etc.).

All AOC holders should ensure that their exposition contains guidance information for crews on the immediate actions to be taken to mitigate the effects if their aircraft is targeted by a laser illumination. In the event that a pilot encounters an unauthorized laser illumination of an aircraft, the following actions are recommended:

- Pilots should avoid looking directly at the source (priority is to minimize exposure effects).
- If your vision is affected, hand over control (assuming a two-pilot crew, and that the other pilot has not been affected).
- Crews manually flying aircraft fitted with modern autopilots and Flight Management Systems (FMS) might need to consider autopilot re-engagement, and use of FMS to aid flight path control.
- Turning up cockpit lighting may assist in overcoming the 'flash' after-effects (peripheral vision may still be effective).
- Do not rub the eyes after exposure.
- If any lingering effect is experienced, crew members should be encouraged to seek medical attention if the eye exposure to a laser is of more than transient duration.
- Report the occurrence immediately to ATC, and as soon as possible through your normal reporting channel.

An unauthorized illumination of an aircraft by a laser considered as an aircraft incident and therefore a pilot experiencing a laser illumination occurrence is required to take a follow-up action through reporting the details of the incident.

Air Traffic Service

As soon as possible following laser illumination occurrence, the flight crew should report the incident by radio to the appropriate ATC unit. Expedious reporting will assist the Police in locating the source of the laser transmission(s).

The initial radio report to ATC should include the following:

- Aircraft call sign
- Nature of report (laser/ Illumination) & Colour
- Aircraft position & altitude at time of occurrence
- Location of origin of light source or relative direction and estimated distance from aircraft
- Any other information that might assist law enforcement.

All ATS units advised of a laser illumination occurrence will take mitigation actions (as appropriate) to provide relevant information for pilots:

- Announce to any following aircraft.
- Forward report to the aerodrome management for liaison to react.

Aerodrome Management

Aerodrome authorities are to ensure that any lasers around have the beam not aimed in the aircraft direction, and/or that the times of operation are controlled, to ensure no hazard is posed to aircraft operations.

In case of LASER attack reported, coordinate with the local police force to establish the most expeditious reaction to such events and provide them with a detailed report to assist in locating the source of the laser in order to enforce stop of such hazard.

Advise AIS to issue cautionary NOTAM in case of repeated exposure.

Contact the CAA as soon as possible following report of a Laser illumination Incident.

Additionally, Aerodrome should monitor the laser-beam free flight zone as part of aerodrome serviceability inspections.

Laser emissions of which exceeds any of the limits or penetrates the protected zones described shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

If laser violation detected during inspections, it should be assessed and surveyed as soon as possible to determine the extent of the infringements. If they exceed the limits specified, the aerodrome will raise a NOTAM.

For any new light works in the vicinity of the aerodrome, aerodrome notify to CAA which has the authority to take action in case of any potential deficiency.

Aerodrome management should direct Laser, light and firework Organizers to seek CAA acceptance prior to displays.

Refer to **Appendix A** Form 1, for a model of suspected laser beam /firework incident report.

Chapter 4

GUIDELINES FOR LASER, LIGHT AND FIREWORK DISPLAY ORGANIZERS

This chapter refers to procedures concerned with temporary laser light and firework displays.

For light and firework displays, Organizers should notify the appropriate authority (normally CAA, or through aerodrome management) of their proposed activity. To allow time to de-conflict or co-ordinate the activity, as well as promulgate warnings to the aviation community and establish any control measures considered necessary, notification needs to be given at appropriate time in advance.

The appropriate authority will examine the proposal based on the following guidelines. If no further information is required then appropriate warning action will be carried out. While the Display Organizer will not routinely receive written confirmation of this, if further information or action is required from the Display Organizer, the appropriate authority may contact the originator of the proposal to discuss suitable future courses of action.

It is of prime importance that light displays and fireworks are never directed at or towards aircraft or aerodromes. The Light Display organizer should also nominate a single point of contact, who will be directly responsible for the conduct of the actual event.

A person proposing to operate a light or a laser shall notify the appropriate authority if:

1. because of its glare or affect on a pilot's vision, the light or laser is liable to endanger aircraft;
2. for a laser, it would produce exposures in navigable airspace exceeding the maximum permissible exposure defined;
3. it is likely to endanger aircraft by being mistaken for:
 - i. a light or part of a system of lights established or approved for display at or near an aerodrome; and
 - ii. a light marking a hazard in navigable airspace; and
4. the location falls within the laser protection zones around an aerodrome.

Display organizers should be aware of the following geographical zone, within which CAA considers it necessary to impose restrictions in order to protect flight operations:

Within 18500m (10 NM) of an aerodrome's notified Aerodrome Reference Point (ARP) or similar, the following procedures should be adhered to:

- a) Ideally, measures should be in place to prevent light escaping towards the aerodrome or along the extended runway centerline.
- b) If this proves impractical, other precautions are to be taken to ensure that light displays do not impinge on safe flight operations, such as arranging for a direct telephone or radio communications link between the point of contact and relevant aerodrome, through which the Light Display can be terminated immediately on request from either an aircraft or the affected aerodrome.

NOTE: If this is not possible, then the light display may represent a threat to flight safety and should not proceed.

Elsewhere, although the light display is unlikely to affect aerodrome flight operations, the Light Display organizer should notify the authority to ascertain if there are any other aviation activities that may be affected by the display.

Refer to **Appendix A** Form 2, for a model of notice of proposal to conduct outdoor laser, light /firework operation(s).

Public Awareness

Product warning labels and product information shipped with laser devices could be enhanced to specifically warn of the dangers these devices pose to aviation safety. While current product labeling on lasers inform operators of the eye hazards posed by lasers, there may be widely held misperceptions that lasers cannot affect a pilot's vision because of the large distances the beam travels before reaching the aircraft. The general public may also lack a full appreciation for the visual demands during critical phases of flight and the potential consequences of visual distractions in the cockpit.

Besides conveying this information in materials shipped with laser products, such information could also be disseminated through public awareness campaigns.

Additionally, public education materials could convey strong messages regarding available criminal penalties and potential legal consequences of using lasers to maliciously target aircraft.

Appendix A

Forms

FORM 1

SUSPECTED LASER BEAM /FIREWORK INCIDENT REPORT	
Name	
Position (pilot, co-pilot, controller, etc.)	
Phone	
Type of vision correction worn at time of incident (spectacles/contact lenses) -	
Type of aircraft	
Aircraft Id or call	
Date and time of incident (UTC)	
Date and time report is being completed (UTC)	
Position (pilot, co-pilot, controller, etc.)	
Phone	
ENVIRONMENTAL FACTORS	
Weather conditions	
VMC/IMC	
Ambient light level (day, night, sunlight, dawn, dusk, starlight, moonlight, etc.)	
LOCATION OF INCIDENT	
Near(aerodrome/city/NAVID)	
Radial and distance	
Phase of flight	
Type/name of approach or departure procedure	
Heading/approximate heading if in turn	
Altitude(AGL), (MSL)	
Aircraft bank and pitch angles	
Angle of incidence	
Did the light hit your eye(s) directly or from the side?	
Light description	
Colour	
Nature of beam (constant/flicker/pulsed)	
Light source (stationary or moving)	
Do you feel you were intentionally tracked?	
Relative intensity (flashbulb, headlight, sunlight)	
Duration of exposure (seconds)	
Was the beam visible prior to incident?	
Position of light source (relative to geographical feature or aircraft)	
Circle the window where the light entered the cockpit: (Left) (left-front) (centre) (right-front) (right) other -----	
Elevation of the beam from horizontal (degrees)	
EFFECT ON INDIVIDUAL	
Describe visual*/psychological/physical effects	
Duration of visual effects (seconds/minutes/hours/days)	
Do you intend to seek medical attention? <i>Note: This is recommended if even minor symptoms were experienced.</i>	
Effect on operational or cockpit procedures	

***Examples of common visual effects:**

After-image. An image that remains in the visual field after an exposure to a bright light.

Blind spot. A temporary or permanent loss of vision of part of the visual field.

Flash-blindness. The inability to see (either temporarily or permanently) caused by bright light entering the eye and persisting after the illumination has ceased.

Glare. A temporary disruption in vision caused by the presence of a bright light (such as an oncoming car's headlights) within an individual's field of vision. Glare lasts only as long as the bright light is actually present within the individual's field of vision.

This form may be used by local ATC or airline to report a suspected laser beam exposure or firework. When completed, the report should be forwarded to the competent authority as soon as possible for further investigation.

FORM 2

NOTICE OF PROPOSAL TO CONDUCT OUTDOOR LASER, LIGHT /FIREWORK OPERATION(S)	
To:	
From: (Applicant)	
Date:	
GENERAL INFORMATION	
Event or facility	
Applicant	
Address of activity	
Date(s) of activity	
Time(s) of activity	
Geographic Location of activity	
Longitude	----- deg (°) ----- min (') ----- sec(")
Latitude	----- deg (°) ----- min (') ----- sec(")
Determined by:	<input type="checkbox"/> GPS <input type="checkbox"/> Map <input type="checkbox"/> Other (specify) -----
Ground elevation at site (above Mean Sea Level)	
Laser/Firework activity height (above ground level)	
Testing and alignment	
Operation	
BRIEF DESCRIPTION OF OPERATION	
ON-SITE OPERATION INFORMATION	
Operator(s):	
On-site phone 1	
On-site phone 2	
Brief Description Of Control Measures	
ATTACHMENTS	
Number of laser / Firework configurations :	
List any additional attachments needed to evaluate this operation (could include maps, diagrams, and details of control measures).	
DESIGNATED CONTACT PERSON (IF FURTHER INFORMATION IS REQUIRED)	
Name:	
Position:	
Phone:	
Fax:	
E-mail:	
STATEMENT OF ACCURACY	
To the best of my knowledge, the information provided in this Notice of Proposal is accurate and correct.	
Name (if different from contact person):	
Position:	
Signature:	

References:

- ICAO Annex 14 Item 5.3.1.
- ICAO Doc 9815, Manual on Laser Emitters and Flight Safety.
- Egyptian Advisory Circular 00-23.
- UAE Civil Aviation Advisory Publication 49.
- UAE Civil Aviation Advisory Publication 65.
- Bahrain Civil Aviation Authority Obligation for the Operation Fireworks, Laser (Draft).

APPENDIX C

RASG-MID SAFETY ADVISORY – 13
(RSA-13)



September 2017

MID-Region

**Wildlife Management and Control Regulatory
Framework & Guidance Material**

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These guidelines are developed by the Runway and Ground Safety Working Group (RGS WG), as part of MID-RAST/RGS/4 DIP deliverables, based on the work of the Sudanese Civil Aviation Authority, the United Arab Emirates Civil Aviation Authority and the Egyptian Civil Aviation Authority in collaboration with the ICAO MID Regional Office within the framework of the Regional Aviation Safety Group - Middle East (RASG-MID).

Disclaimer

This document has been compiled by members of the aviation industry to provide guidance for civil aviation regulators, aerodrome operators and other stakeholders in order to enhance aviation safety. It is not intended to supersede or replace existing materials produced by the States national regulators or in ICAO SARPs. The publication of this document does not prejudice the National Regulator's ability to enforce existing national regulations. To the extent of any inconsistency between this document and the National/International regulations, standards, recommendations or advisory publications, the content of the National/International regulations, standards, recommendations and advisory publications shall prevail.

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INTRODUCTION

BACKGROUND

Wildlife Management and Control had been identified by the MID Region Annual Safety Report Team (ASRT) as part of one of three main risk areas (Focus Areas) to be addressed under the MID Region Aviation Safety Group (RASG-MID) framework.

The MID-RAST RGS has undertaken a Safety Enhancement Initiative (SEI) to develop guidance material and training programs to support creation of action plans for Wild Life Management and Control. The Detailed Implementation Plan (DIP) for the SEI included the action to develop and issue regulatory framework supporting establishment of Wild Life Management and Control Teams.

PURPOSE

The purpose of this circular seeks to propose a regulatory framework to support the creation and success of local Wild Life Management and Control entity consisting of the following elements:

(Chapter 1)

Model Regulation including articles related to Wildlife Management and Control that clarify main responsibilities of Civil Aviation Authority (CAA) and Aerodrome Operator and their relation with other national entities regarding wildlife management and control roles and enforcement.

(Chapter 2)

Guidance Material provides detailed instructions on the implementation of the requirements contained in the State's National Civil Aviation Regulations regarding the control of wildlife in the vicinity of an aerodrome. It sets the regulatory framework applicable in each State for wildlife hazard assessment, the recording and reporting of wildlife strikes to aircraft as required by ICAO. These materials should be considered in conjunction with the ICAO PANS Aerodrome. This chapter includes requirements for the evaluation of the wildlife hazard by airport operators as well as the development and implementation of wildlife control measures to minimize the likelihood of collisions between wildlife and aircraft.

(Chapter 3)

Model Guidance for Development of Wildlife Hazard Management Programs at Airports provides guidance to evaluate the Ecological Study (Wildlife Hazard Assessment) and Wildlife Hazard Management Plan (WHMP) submitted by Aerodrome Operators. These materials are developed by the Aerodrome Operator and may be evaluated as part of Aerodrome Certification, during periodic surveillance audits or during the change management process. The evaluation may be conducted by the Aerodrome Operator or the CAA depending on the responsibilities as established by the State.

USING THIS CIRCULAR

The Table of Contents provides key points of the regulatory framework supporting the creation of Wildlife Management and Control Teams.

The reader will choose the depth at which the circular will be used at any given time. Reading may range from using the Table of Contents or elements of the model regulation as a benchmark for gap analysis – to adopting and/or adapting the content of the proposed model regulation and guidance/oversight materials as part of a national regulatory framework.

CHAPTER 1

MODEL REGULATION IN SUPPORT OF AERODROME WILDLIFE MANAGEMENT & CONTROL

1.1 Application

Each State should publish applicable National Civil Aviation Regulation which includes requirements for Wildlife Management at and in the vicinity of aerodromes. The following paragraphs contain articles, in support of this objective, which should be assessed by each CAA

1.2 Preface to Model Regulation

The following provides a model order summarising the links between the National Civil Aviation Law, the Civil Aviation Authority (CAA), National Civil Aviation Regulation and the Aerodrome Manual by way of example. The specifics of these relationships will vary from State to States however the obligations of the CAA and Aerodrome Operator should always be clear.

Model Order entitled Wildlife Control (example)

- The National Civil Aviation Law gives the CAA the powers to set aerodromes standards.
- The aerodromes standards have been further specified in National Civil Aviation Regulation and include the requirements for wildlife strike hazard reduction in the vicinity of aerodromes.
- National Civil Aviation Regulation requires an Aerodrome Operator to evaluate the wildlife hazard in the vicinity of the aerodrome and adopt measures to minimize the likelihood of collisions between wildlife and aircraft.
- National Civil Aviation Regulation requires the development and implementation of a procedure for recording and reporting wildlife strikes to aircraft as well as wildlife hazard assessment and control measures which are included in the Aerodrome Manual.

1.3 Model Regulation

1.3.1 Wildlife Strike Hazard Reduction

1.3.1.1 The wildlife strike hazard on, or in the vicinity of, an aerodrome Shall be assessed through:

- a) the procedure for recording and reporting wildlife strikes to aircraft prescribed;
- b) the collection of information from aircraft operators, airport personnel, and other sources, on the presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations; and
- c) an ongoing evaluation of the wildlife hazard by the airport operators.

1.3.1.2 The wildlife hazard assessment should be documented in the Aerodrome Manual.

- 1.3.1.3 The aerodrome operator should forward wildlife strike reports to the CAA for onward transmission to the ICAO Bird Strike Information System (IBIS) database.
- 1.3.1.4 Action should be taken to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft. The wildlife control measures should be documented in the Aerodrome Manual.
- 1.3.1.5 Action by the CAA Authority and Aerodrome Operator is required to eliminate or to prevent the establishment of garbage disposal dumps or any other source which may attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates that they are unlikely to create conditions conducive to a wildlife hazard problem. Where the elimination of existing sites is not possible, the authority shall ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.
- 1.3.1.6 A due consideration should be given by the State to aviation safety concerns related to land developments in the vicinity of the aerodrome that may attract wildlife.

1.3.2 Roles & Responsibilities

1.3.2.1 Civil Aviation Authority (CAA)

- 1.3.2.1.1 The CAA is responsible for the development and issuance of the regulatory and guidance material applicable to aerodromes design and operations.
- 1.3.2.1.2 The CAA evaluates the Aerodrome Manual submitted by an Aerodrome Operator including the wildlife hazard assessment and the wildlife control measures to determine whether it complies with National Regulation and indicate whether the applicant will be able to operate and maintain the aerodrome properly.
- 1.3.2.1.3 The CAA collects, through its reporting systems, information from aircraft operators, airport personnel, and other sources, on the presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations.
- 1.3.2.1.4 The CAA adopts the mutual coordination and communication among aerodrome operator and any other state departments regarding land-use planning and development In the vicinity of aerodrome as long as this development affects the likelihood of wildlife existence.
- 1.3.2.1.5 Finally, the CAA submits Wildlife Strike Reports to the ICAO Bird Strike Information System (IBIS) database.

1.3.2.2 Aerodrome Operator

- 1.3.2.2.1 The Aerodrome Operator is responsible for the conduct of a wildlife hazard assessment in the vicinity of the airport.
- 1.3.2.2.2 The Aerodrome Operator is also required to include in the aerodrome manual, the wildlife hazard assessment and the measures adopted to control the identified hazards and minimize the likelihood of collisions between wildlife and aircraft.

1.3.2.2.3 The Aerodrome Operator, in cooperation with CAA, approaches and communicates with the different state-related departments in the aerodrome vicinity to be notified with any development or land-use planning which may affect the likelihood of wildlife existence. In order that the aerodrome operator may evaluate the expected impact behind that development or land-use planning.

1.3.3 Wildlife Hazard Assessment

1.3.3.1 **Initial Assessment:** An Aerodrome Operator must conduct for each aerodrome an initial assessment of the existence and level of hazard posed or likely to be posed by wildlife in the vicinity of the aerodrome.

1.3.3.2 The initial Wildlife Hazard Assessment must be conducted by wildlife specialists, with proven knowledge of the types and behaviours of the wildlife species present or likely to be present in the area where the aerodrome is located.

1.3.3.3 The initial Wildlife Hazard Assessment should:

- a) identify the wildlife species that have access to the airport, in accordance with 1.3.3.5 cross;
- b) describe the features that may attract wildlife, in accordance with 1.3.3.6;
- c) assess the wildlife hazards or potential hazards to aircraft operating to or from the aerodrome, in terms of:
 - i. the likelihood of occurrence of a wildlife strike; and
 - ii. its impact on the flight; and
- d) recommend actions for reducing identified wildlife hazards to aircraft operating to or from the aerodrome, using one or more of the control measures prescribed in Chapter 3.

1.3.3.4 The methodology used for the identification of wildlife species must be documented in a standardized procedure. As a minimum, it should include the number and location of the survey points established, the duration of the observation, and how the selected duration allows for adequate assessment of the wildlife species and seasonal patterns.

1.3.3.5 For each type of wildlife species, the following information must be provided:

- a) methodology used for observation;
- b) its scientific and local name;
- c) estimated numbers and locations; and
- d) local movements, daily and seasonal occurrences.

1.3.3.6 Potential wildlife attractants may include:

- a) waste disposal;
- b) water management facilities;
- c) wetlands;
- d) confined disposal facilities;
- e) Agricultural activities (livestock, aquaculture, farming ...etc.);
- f) Landscaping; or
- g) any other specific land-use activities that may attract wildlife.

1.3.3.7 The description of the potential wildlife attractants should include:

- a) name;
- b) distance from the aerodrome reference point;
- c) direction from nearest approach / take-off path;
- d) dimensions;
- e) type of activities;
- f) seasonality (if applicable); and

g) wildlife species that may be attracted to it.

- 1.3.3.8 The wildlife hazards or potential hazards can be categorized on the basis of their probability and severity.
- 1.3.3.9 An example of classification of the hazards is given in appendix c, table's appendix c -1 to appendix c-3 indicating the probability of occurrence, its severity if it occurs and the combination of probability/severity.
- 1.3.3.10 A colour coding may be used to indicate what is intolerable (Red – unacceptable under the existing circumstances), tolerable (Yellow – acceptable based on mitigation measures to control wildlife) or acceptable (Green – acceptable).
- 1.3.3.11 **Continuous Assessment:** The Aerodrome Operator should establish a procedure for continuous assessment of the wildlife hazard.
- 1.3.3.12 **Periodicity:** The Wildlife Hazard Assessment should be reviewed :
- a) at least once a year; or
 - b) after a wildlife occurrence.
- 1.3.3.13 **Nature and Level of the Hazards:** The review of the wildlife hazard assessment should identify any changes in:
- a) wildlife species;
 - b) the features that may attract wildlife on, or in the vicinity of the aerodrome; or
 - c) the assessment of the wildlife hazards or potential hazards to aircraft operating to or from the aerodrome.
- 1.3.3.14 **Effectiveness of the Control Measures:** The review of the wildlife hazard assessment should identify:
- a) new wildlife control measures that may be required of address newly identified hazards; and
 - b) existing wildlife control measures that may need to be reinforced, and/or wildlife control measures to be discontinued because they are no longer required or are ineffective.

1.3.4 Wildlife Control

- 1.3.4.1 **General:** The aerodrome operator should demonstrate that the proposed wildlife control measures are adequate to reduce the risk posed by wildlife to aircraft operating to or from the aerodrome as identified in the wildlife hazard assessment or its subsequent review. Examples of wildlife control measures are provided in 1.3.4.2 to 1.3.4.6.
- 1.3.4.2 **Description of the Control Measures:** The description of the selected control measures should include:
- a) type of control measures selected;
 - b) wildlife species;
 - c) potential wildlife attractants;
 - d) actions to be implemented;
 - e) periodicity, or season(s) where applicable;
 - f) equipment to be used, where applicable; and
 - g) personnel involved and the training requirements where applicable.

- 1.3.4.3 **Habitat Modification and Exclusion:** Habitat modification means changing the environment to make it less attractive or inaccessible to the problem wildlife identified during the wildlife hazard assessment. It can be achieved through the reduction, elimination, or exclusion of one or more of the elements that attract wildlife such as:
- a) Food;
 - b) Water; or
 - c) shelter.
- 1.3.4.4 **Wildlife Removal:** if legally allowed for the species being considered , wildlife removal may include:
- a) Capturing;
 - b) destroying eggs and nests;
 - c) shooting;
 - d) oral or contact toxicants;
 - e) fumigants; or
 - f) lethal traps.
- 1.3.4.5 **Repellent and Harassment Techniques:** Repellent and harassment techniques may be used to keep hazardous wildlife away from specific areas on or near an airport by affecting the animal's senses through chemical, auditory or visual means. Repellent and harassment techniques may include:
- a) patrols of airside areas to disperse birds and other hazardous wildlife;
 - b) chemical repellents legally allowed for use in Sudan by the relevant national authorities;
 - c) audio repellents appropriate to the type of bird or mammal; or
 - d) visual repellents appropriate to the type of bird or mammal.
- 1.3.4.6 **Aircraft Schedule Modification:** The flight schedules of some aircraft may be adjusted to minimize the chance of a strike with a wildlife species that has a predictable pattern of movement.

1.3.5 Recording and Reporting Wildlife Strikes

- 1.3.5.1 **Recording:** Aerodrome Operators should maintain a log of wildlife strikes containing the date, types and numbers of birds or animals, and aircraft involved. The procedure for recording the wildlife strikes must be documented in the Aerodrome Manual.
- 1.3.5.2 **Reporting:** A Wildlife Strike Reporting Form is made available to aircraft operators, airport personnel and air traffic controllers to report wildlife strikes.
- 1.3.5.3 **Submission of Wildlife Strike reports to ICAO:** CAA should have wild life strike data base and mechanism to ensure that all strike reports are consistent, error-free data before entering a single, consolidated report into the database. Time interval for update and review the stored date should be implemented (may be every six weeks); the CAA should send a current version of the database to the International Civil Aviation Organization (ICAO) for incorporation into ICAO's Bird Strike Information System (IBIS) Database.

Note: Appendix F provides a guide for the bird strike reporting form, for further information can be found: ICAO airport service manual, part 3, item 3.5 Figure 3-1. and 3-2.

CHAPTER 2

MODEL PROCESS FOR ASSESSMENT OF WILDLIFE HAZARD MANAGEMENT

2.1 Purpose

To provide guidance to personnel appointed to evaluate of Ecological Study (Wildlife Hazard Assessment) and Wildlife Hazard Management Plan (WHMP) submitted by Aerodrome Operators. These materials are developed by the Aerodrome Operator and may be evaluated as part of Aerodrome Certification, during periodic surveillance audits or during the change management process. The evaluation may be conducted by the Aerodrome Operator or the CAA depending on the responsibilities as established by the State.

The model process below is based on requirement for the Aerodrome Operator to submit the Ecological Study (Wildlife Hazard Assessment) and WHMP directly to the CAA for evaluation and acceptance.

2.2 Applicability

This model Operating Procedure is applicable to the assessment of Ecological Study (Wildlife Hazard Assessment) and WHMP.

2.3 Regulatory System

- a. Civil Aviation Law [.....]
- b. [Caa Regulation]
- c. [Advisory Circular]
- d. [Inspector Handbook/ ...]
- e. [...]

2.4 Responsibilities

- a. The Ecological Study (Wildlife Hazard Assessment) may be evaluated by specialist (third party contract / competent inspectors).
- b. The WHMP shall be evaluated by the [xxxx] appointed by [xxxx].
- c. The Team Leader is responsible for conducting and reporting the evaluation process.
- d. The WHMP are approved by the [xxxxx].

2.5 Procedure

2.5.1 Introduction

It is required that aerodromes exposed to wildlife hazards analyse the level of risk posed by the existing hazards to enable a determination of the need for a WHMP. It is not anticipated that such a determination can always be reached before the commencement of initial operations at the aerodrome. Data collection on wildlife activity in the vicinity of the aerodrome and subsequent analysis may take some time after aerodrome operations begin before meaningful conclusions can be drawn concerning the Wildlife Management Program to be implemented, where applicable. However, it is anticipated that a procedure for monitoring bird activity and of recording and reporting bird strike be established and incorporated in the Aerodrome Manual before approval of the Manual by the CAA.

2.5.2 Application of Ecological Study

Aerodrome Operators are required to submit all the documents needed to demonstrate the level of risk posed by the existing hazards to enable a determination of the need for a WHMP.

The application should be accompanied by the following documentation at least:

1. Hazard Analysis of the event which prompted the study.
2. Identification of the species, numbers, locations, local movements, and daily and seasonal occurrences of wildlife observed.
3. Identification and location of features on and near the airport that attract wildlife.
4. Description of the wildlife hazard to air carrier operations.
5. Form provided in Attachment 1, signed by the Accountable Manager and by the Safety Manager,
6. Any other document deemed useful by the aerodrome operator or requested by CAA.

2.5.3 Approval/Acceptance of Ecological Study

Step 1: Upon receipt of an application, the [assign Team] should conduct a preliminary check in order to establish if it is compliant with the relevant provisions of Regulation - and if all the documents have been submitted.

Step2: After the preliminary check, the [Team] should evaluate the content of the submitted application, in order to establish if the proposed study can be accepted, taking into account the potential impact of the wildlife hazard on aircraft operation.

Step3: [DASS] (or equivalent directorate) should communicate in writing to the concerned Operator the - positive or negative - result of evaluation or the request for further explanations, within the applicable timeframe (ref. [Law...]).

Step 4: Once accepted [DASS] (or equivalent directorate) request from the concerned Operator to submitted the Wildlife Hazard Management Plan.

2.5.4 Approval of Wildlife Hazard Management Plan (WHMP)

Step 1: Upon receipt of an application, the [assigned Team] should conduct a preliminary check in order to establish if it is compliant with the relevant provisions of the National Civil Aviation Regulation.

Step 2:

- After the preliminary check, the [assigned Team] should evaluate the content of the submitted application, in order to establish if the proposed procedure and hazard mitigation can be accepted.
- The assessment can be obtained by using different methods, use form no. 1 (the aim is to demonstrate that the proposed solution ensures the safety of the aircraft operation). By ensuring the following:
 - 1) Its effectiveness in dealing with the wildlife hazard.
 - 2) Indications that the existence of the wildlife hazard, described in the ecological survey, should be re-evaluated.
 - 3) Procedures outlined in the Plan, such as inspections prior to air carrier operations, are carried out.
 - 4) The reporting system are clear and applicable related to size of the aerodrome and the traffic density

- 5) Procedure to deal with the habitat modification projects or changes in land use identified in the Plan
- 6) Procedures are established by the Aerodrome Operator for the conduct of a wildlife risk assessment
- 7) Implementation Plan (timeline) be prioritized and respect the mitigation measure

For the purposes of the assessment* - in addition to examining the submitted documents - [CAA] may require to conduct audits or inspections as well as to participate in demonstrations or tests carried out by the operator, as deemed appropriate.

**may use (form 1) and (Model Aerodrome Pre-Audit Assessment Form appendix D RASG-MID SAFETY ADVISORY – 05 (MID-Region Aerodromes Certification Toolkit)*

Step 3: The [assigned Team] should verify if the Aerodrome Operator has reported the related information in the appropriate sections of the Aerodrome Manual and has arranged with the AIS Provider for publishing the relevant data on the AIP (if it needs to demonstrate the hazard to air carrier).

2.6 Records

In order to comply with National Civil Aviation Regulation the [Team Leader] is responsible for ensuring that all the relevant documents relating to wildlife management plan (as listed in the preceding paragraphs) are properly maintained in the [Aerodrome File], providing for adequate storage, accessibility, traceability of data.

The above mentioned documents are maintained in the Aerodrome file for the lifespan of the Certificate.

2.7 Forms

Appendix A - Wildlife Hazard Management Assessment Checklist

CHAPTER 3

MODEL GUIDANCE FOR DEVELOPMENT OF WILDLIFE HAZARD MANAGEMENT PROGRAMS AT AIRPORTS

3.1 Introduction

The extent of a wildlife hazard at particular airport locations is widely variable. Many solutions are available but none are likely to be useful at any one airport, the most important action, upon which any risk management strategy must be founded, is knowing the nature of the hazard; this may vary by time of day and seasonally and must be related to the likely pattern of aircraft movements. For that Aerodrome Operators are required to establish all the documents needed to demonstrate the level of risk posed by the existing hazards of the wildlife hazard to enable them to establish the effective criteria for mitigate the hazard of the wildlife

3.1.1 Phase I: Wildlife Hazard Assessment /Ecological Study

Starting with a Wildlife Hazard Assessment Study is highly recommended which is starting with collecting data (information, records, etc...) (INPUTS), then analyses all these data to identify the hazard which will affect to aircraft operation.

Step 1: Data Collection

1. All the previous events and bird strikes records and statistics.
2. Analysis of the event which prompted the study.
3. All the records of damaging collisions with wildlife other than birds.
4. Observed wildlife species.
5. Observed wildlife numbers and sizes.
6. Observed wildlife locations and local movements.
7. Observed wildlife daily and seasonal occurrences.
8. Identification and location of wildlife attractants on and near the airport.

Note: An Airport Operator may use the form in Appendix B - Data Collection Template for Observed Wildlife to describe the observed wildlife related to the number, location and wildlife movement period - Otherwise an Airport Operator may establish maps including details about habitats, major topographical features, wildlife movements, etc. (Highlighting the wildlife that are pertinent to the objectives) / Maps over the course of several seasons so as to account for changes in wildlife and habitat. List in details the resources, habitats, and wildlife present on your land. Include details about size of species, movements of animals, seasonal change, etc...

Step 2: Data Analysis

Analysis all collected data of the wildlife hazard to air carrier operations.

Step 3-4: Document Preparation: The study describe in above paragraph should be introduced to CAA to determine whether or not there is a need for a Wildlife Hazard Management Plan (WHMP) taking into consideration some important parameters refer to (Chapter 2 in this manual)

3.1.2 Phase II: Establish Wildlife Hazard Management Plan (WHMP)

The goal of this Wildlife Hazard Management Plan (WHMP) is to promote aviation safety for passengers and flight crews by reducing wildlife hazards and associated risks to aircraft and airport operations caused by wildlife activities on and in the airport vicinity. A wildlife management plan is a document used by airport operator to outline and implement steps for preserving, altering, or exploiting wildlife on /off airport, a management plan usually contains maps, descriptive documents.

The WHMP should be established based on the ecological study (Wildlife Hazard Assessment) and should contain at least the following:

1. Foreword
2. Glossary
3. Definitions
4. Objective
5. Duties & Responsibilities
6. Wildlife Hazard identification and Assessment
 - (a) All the previous events and bird strikes records and statistics.
 - i. The most significant wildlife hazard that induces events.
 - ii. The most potential time and date of events occurrences.
 - (b) All the records of damaging collisions with wildlife other than birds.
 - (c) Observed wildlife species.
 - i. Basic information about the wildlife at the airport region.
 - ii. The airport region relevant biodiversity.
 - iii. The most significant wildlife species behaviour.
 - iv. The main reasons for such wildlife species existence or flying over.
 - v. Migratory flyway (If it is migratory bird species).
 - vi. Flyway altitude.
 - vii. Determination of the altitudes and geographical sites of interference between aircrafts pathway and the migratory birds' flyway.
 - (d) Observed wildlife numbers and sizes.
 - (e) Observed wildlife locations and local movements.
 - i. The most significant bird flocks gathering points and geographical distribution at the airport region (on or within the airport vicinity).
 - ii. The local movement of bird flocks determination.
 - (f) Observed wildlife daily and seasonal occurrences.
 - (g) Identification and location of wildlife attractants on/in the vicinity of aerodromes.

On Airport

- i. Solid waste transfer stations
- ii. Water treatment facilities
- iii. Maintenance hangers
- iv. Landscapes
- v. Recycling stations
- vi. Wetlands
- vii. Agricultural activities
- viii. Others

Airport Vicinity

- i. Landfills
- ii. Waste water oxidation ponds
- iii. Forestry
- iv. Agricultural activities
- v. Landscapes
- vi. Golf courses

7. Description of the wildlife hazard to air carrier operations
8. Wildlife Control
 - (h) Monitoring
 - i. Daily Wildlife Management Log
 - ii. Monthly Summary
9. Establishment of Performance Indicators and Self-Assessment
10. Recording and Reporting Wildlife Strikes.

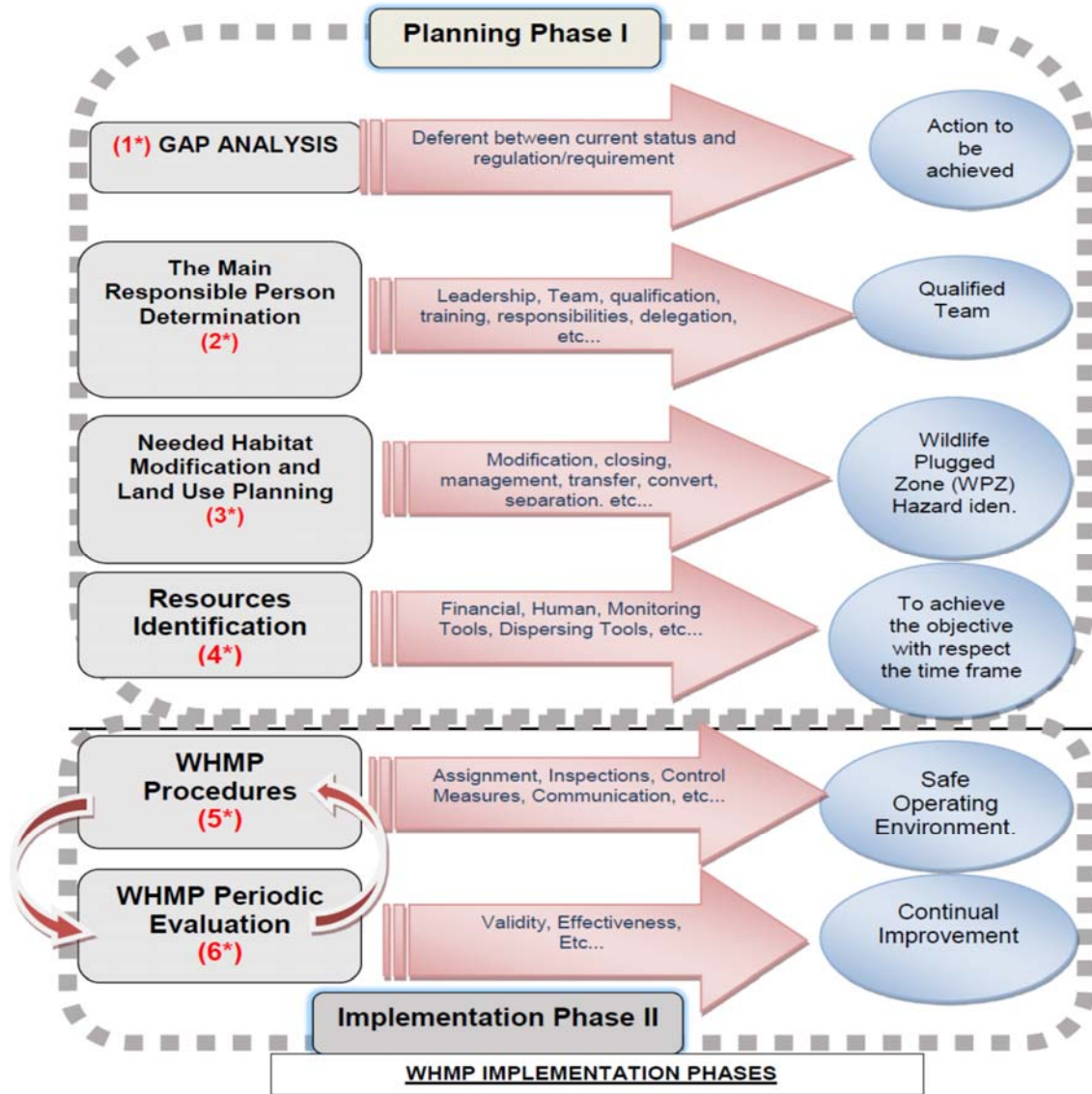
3.2 WHMP Implementation Phases

3.2.1 The purpose of this Section is to establish criteria for implement the WHMP by the following components:

1. Phase I : Planning Phase
 - (a) Conduct Gap Analyses
 - (b) Resource Allocation

- (c) Responsibility Identification
- (d) Hazard Identification
- 2. Phase II : implementation phase
 - (a) WHMP Implementation Procedures
 - (b) Periodic Evaluating

Note: see Figure 1 – WHMP implementation phases



Process #	Task Title	Process	Deliverable
Phase I: Planning Phase			
1*	Gap Analysis	Current situation vs objectives	Requirements needed to be fulfilled
2*	Resource Identification	Human, financial, tools, etc...	Allocated all needed resource for Suitable work environment

3*	Responsible Person Determination	Team assignment and training	Qualified team
4*	Habitat Modification	Management, closing, transfer, etc...	Passively created considerable safe operating environment
<u>Phase II: Implementation Phase</u>			
5*	WHMP Implementation Procedures	Inspection, wildlife dispersing, recording, analysis, etc...	Actively created considerable safe operating environment
6*	Periodic Evaluating	WHMP Validity and effectiveness verification	Verified and audited plan which includes continual improvement

Figure -1 WHMP implementation phases

3.2.2 Phase I: Planning Phase

Step 1*: Gap Analysis (Where Are You? And What Should You Be?)

A gap analysis is a method of assessing the differences in performance between a current situation (present state) and standard situation (the target state) to determine whether requirements are being met and, if not, what steps should be taken to ensure they are met successfully. Gap refers to the space between "where we are" (the present state) and "where we want to be".

The first step in conducting a gap analysis is to establish specific target objectives by looking at the strategic goals and improvement objectives which are stated in WHMP.

The next step is to analyze current state processes by collecting relevant data on performance levels and how resources are presently allocated to these processes. This data can be collected from a variety of sources depending on what's being analysed, such as by looking at documentation and observing current activities. Lastly, after an airport compares its target goals against its current state, it can then draw up a comprehensive implementation plan to fulfil the gap between its current and future states, and reach its objectives level

Note:

C - Risk Analysis may be used to conduct gap analysis

Step 2*: Resources Allocation:

Airport Operator responsible for allocate the resources to implement the appropriate wildlife hazard management techniques these resource is define as:

Human Resources Identification: assign key person from the following department (the Wildlife Hazards Control Team) and other contributing airport personnel for implementing each phase of the plan

- a. Environmental Department
- b. Safety Department
- c. Operations Department
- d. Maintenance Department
- e. Security Department
- f. Air Traffic Control (ATC)
- g. Planning Department
- h. Financing Department
- i. Wildlife Controller (Coordinator): (To oversee the daily activities and analyze the collected data and carry out risk assessments in order to develop and implement the WHMP).

Financial Resources Identification: In coordinating with Planning and Financing Departments, the Airport Operator should determine the most appropriate wildlife monitoring and dispersing tools to be purchased and the training to be provided.

Step3*: Responsibility Determination:

- The Airport Operator’s responsibilities should be borne by the senior manager role and this should be specified in the aerodrome Safety Management System (SMS). The Wildlife Control Coordinator is in charge of the implementation of the WHMP. The Wildlife Control Operators carry out the required tasks and field work. A Wildlife Committee will ensure that all stakeholders are engaged in the WHMP.
- The assignment of actual roles, titles and tasks will vary from airport to airport. At smaller airports the roles might be divided or merged to just 1 or 2 levels. Larger airports will require larger, possibly dedicated teams. Some tasks or roles may be contracted to an external company or organization.

Note: see Figure 2 – Organisation Chart ((this organization chart may be differ from one State to another).

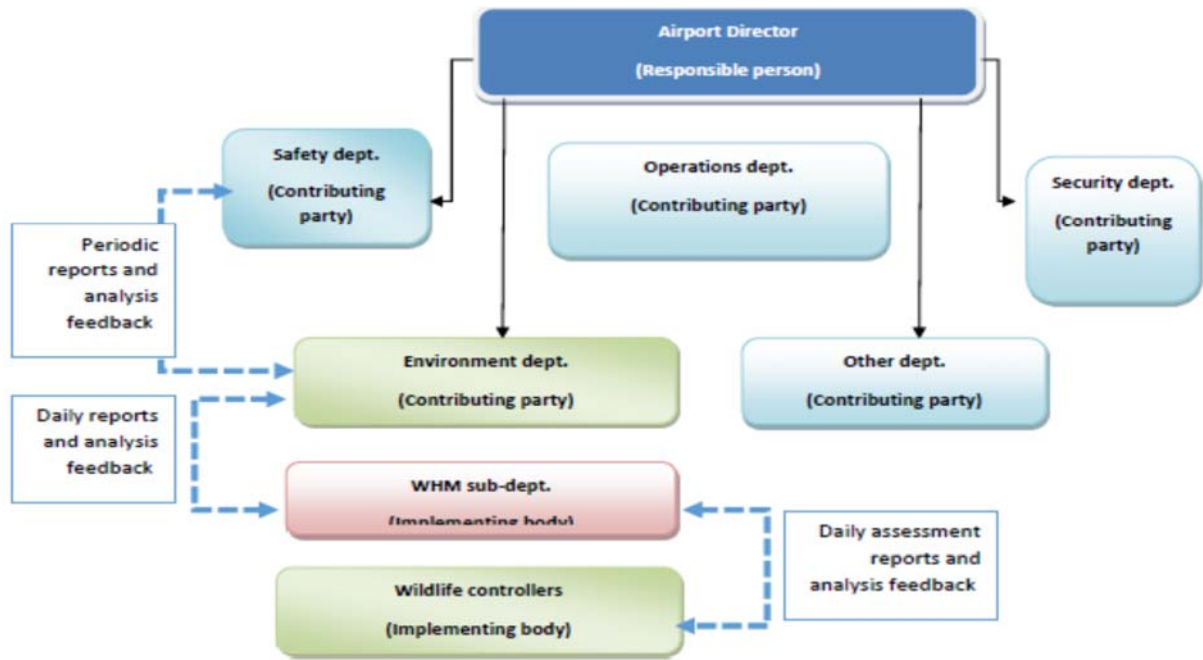


Figure 2: Organisational Chart

Roles & Responsibilities of Wildlife Hazard Management (Coordinator) and Relevant Team (Front-Line Personnel (Wildlife Controllers)):

1. Monitoring birds local movements area on/in the airport vicinity using one of the monitoring tools from the highest point at airport (as much as possible) especially the airport movement area with the aim of quick intervention in case of presence of such wildlife hazards to prevent the likelihood of bird strikes or any other damaging collisions.
2. Daily inspections and patrolling of the airport movement area to verify wildlife hazard and/or wildlife hazard attractants absence.
3. Periodical inspection of the wildlife hazards attractants on/in the aerodrome vicinity.

4. Wildlife hazard management and control relevant records and checklist filling out and keeping.
5. Raising up weekly and monthly reports conveying the current situation of his activities, performance, and any other relevant duties.
6. Keeping in contact with quick reaction with the ATC department in case of any emergency notifications regarding wildlife existence.
7. Coordinate the activities of the WHMP with air traffic control (ATC) and other stakeholders and contributors (as mentioned in the following flowchart).
8. Bird/wildlife observations, control and reporting.
9. Review strike reports, monitor daily activity records and maintenance reports to determine the requirements for short- and long-term management plans, and this information should be passed to managers accountable for safety on a regular basis at least on monthly basis (Ref: ICAO Service manual part 3).
10. Regular coordinating with WHMP other contributing parties and informing them with their roles and responsibilities in WHMP implementation.

Note: Appendix E Key Roles and Responsibilities provides a guide for the key roles and responsibility, for further information can be found: ICAO Airport Service Manual, part 3, Wildlife Control and Reduction, 3.3 Role of the Airport Operator and 3.4 Role of Bird/ Wildlife Strike Control Coordinator and ACI Wildlife Hazard Management Handbook Section 2.

Step 4*: Needed for Habitat Modification and Land Use Planning:

Hazards attractants recognizing (description of wildlife habitats and resources): Habitat management is the heart of airport's Bird/Wildlife Hazard Management Program because it offers ecologically based, long-term measures for reducing the number of hazardous birds/wildlife at the airport. Before undertaking activities to manage the environment, it is important to first carry out an Ecological Survey (refer to item (3.1.2) of the airport and surrounding area to identify sources of food, water and shelter attractive to wildlife on and in the vicinity of the airport.

Categorized the hazard as the following:

- **1st Landscape Category** which is the airport itself, where habitats and the wildlife using them will be described in detail. This will rely on site-specific field work and standard techniques for describing vegetation communities (e.g., Ecological Land Classification) and wildlife communities, their use patterns and seasonal variations that have been observed or that might be expected.
- **2nd Landscape Category** which is the nearby lands those are not under direct control of the airport. The physical area included in this category generally includes lands up to 8 km from the airport reference point, which should include an area of sufficient size to provide an adequate picture of wildlife movements through the airspace identified later in this document. This assessment is largely based on existing information and remotely sensed habitat analysis rather than site-specific field work. It will describe the location of moderately hazardous land use practices such as wastewater discharge plants and sewage lagoons, crop production, recreational sites and managed or created wildlife habitats. There is no requirement under the regulation to manage these lands however it is important to be aware of potentially hazardous off airport land uses.
- **3rd Landscape Category** which is the determination of the presence of extremely hazardous land use practices that may be many kilometres from the airport. At a minimum, food waste disposal sites, outdoor composting and commercial fish plants will be mapped when they occur within 15 km of the airport reference point. Such features may be mapped at greater

distances where wildlife associated with them may become a hazard to aircraft using the airport.

3.2.3 Phase II: Implementation Phase

Step 5*: WHMP Operational Process:

The Wildlife Hazard Implementation Process should have formal mechanism to ensure that the Wildlife Hazard Management Plan (refer to item 3.1.2 in Establishment Phase) will be implemented effectively for that's the following procedures should be followed (Figure 3):

1st Administrative Mechanism

2nd Control Wildlife Mechanism including:

- a. Habitat (wildlife hazard attractants) management mechanism on/in the airport vicinity.
- b. Using most suitable and effective dispersing tools (removing hazardous wildlife).

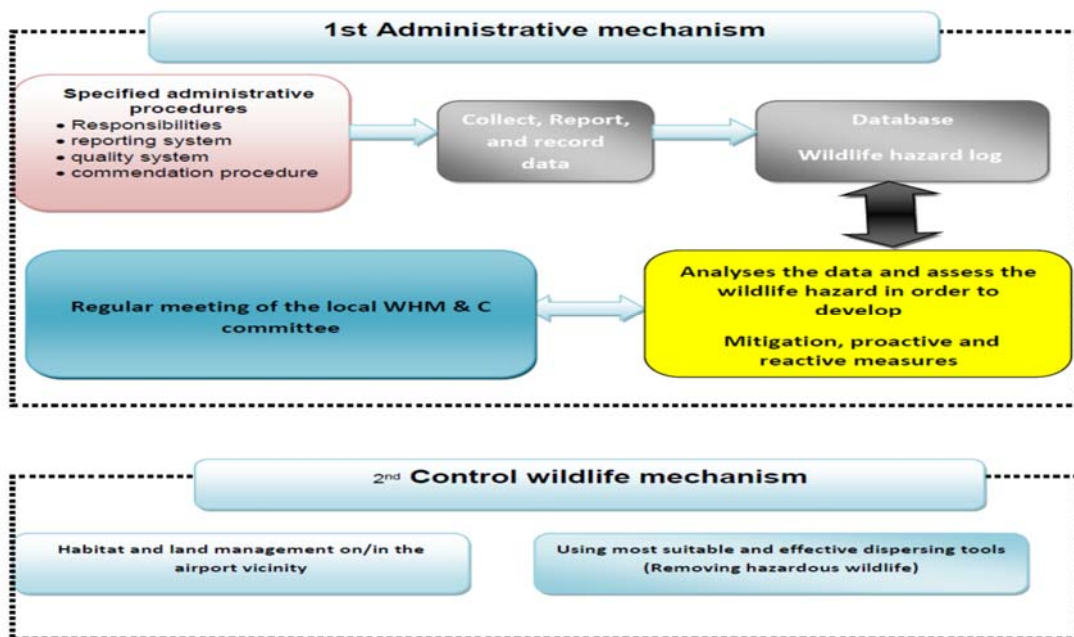


Figure 3

1st Administrative Mechanism

- For effective implementation the Airport Operator should have specified administrative procedures whether to activate the key person responsibilities, writing reports and quality system include documents control system
- Senior airport staff will be responsible for the implementation of this WHMP. This includes the acquisition of the various permits, the provision of training and awareness programs and the review and submission of the annual strike reports and two-year updates.
- Senior management, or their designate, will be responsible for coordinating, supervising and the overall management of the WHMP on a long-term and a daily basis at the site-specific level. This will include the nomination of the key Wildlife Management Officer, co-ordination of training, safety assurance and ensuring that the necessary equipment is available.

- **Appendix E - Key Roles & Responsibilities** provides the roles and responsibilities for all key person

Note: Further information can be found: ICAO Airport Service Manual, Part 3, Wildlife Control and Reduction, 3.3 Role of The Airport Operator and 3.4 Role Of Bird/ Wildlife Strike Control Coordinator and Wildlife Hazard Management Handbook Section 2.

- Regular meeting of the Local Wildlife Hazard Management and Control Committee.
- Wildlife Hazard Management on an airport often requires communication, cooperation, and coordination among various groups on the aerodrome. Establishment of the Airport Wildlife Committee is required to facilitate this communication, cooperation and coordination. This committee might be included within the Safety Management Committee.

Members:

- a. Airport Operator.
- b. Bird/Wildlife Department Team.
- c. Maintenance Department Representative/s.
- d. Planning Department Representative/s.
- e. Financing Department Representative/s.
- f. Operations Department Representative/s.
- g. ATC Representative/s.
- h. Security Department Representative/s.
- i. Environment Department Representative/s.
- j. Agriculture Department Representative/s.
- k. Airport Using Airlines Representative/s.
- l. Local Runway Safety Team Representative.

Roles and Responsibilities:

- a. Review strike data collected.
- b. Assess bird/wildlife risks.
- c. Summarize trends in order to evaluate and determine what effective and most suitable control measures should be implemented in order to manage the bird/wildlife hazards.

Committee Meeting Intervals:

Based on the airport complexity and the level of bird/wildlife existence (recommended monthly).

- An integrated approach is needed to coordinate through the airport organizations. It is important to have effective communication between those involved in bird/wildlife dispersal and air traffic control. Upon receipt of notice of a specific wildlife threat, air traffic control should issue appropriate warnings to aircraft on and in the vicinity of the airport. (Aircraft operators also are part of such an integrated approach by implementing their roles upon receipt of the warning of a specific threat.)

Note: Further information can be found: ICAO Airport Service Manual, Part 3, Wildlife Control and Reduction, Chapter 5.

Example of communication procedures should be stated in Wildlife Management Plan (*see figure 4*):

1. Information will be provided directly from the wildlife observer on duty to Air Traffic Services (ATS) via radio contact.
2. Wildlife observer responsible for ensuring that updated wildlife information is provided to ATS immediately if an urgent situation arises

and on a regular basis depending on the current conditions, or when requested by ATS.

3. ATS deployment any information received from aircraft operator concern wildlife observations to wildlife observer in a timely manner.
4. ATS will provide information to pilots on current wildlife hazards and will ask pilots to report any wildlife observations to ATS especially those observed while taxiing.

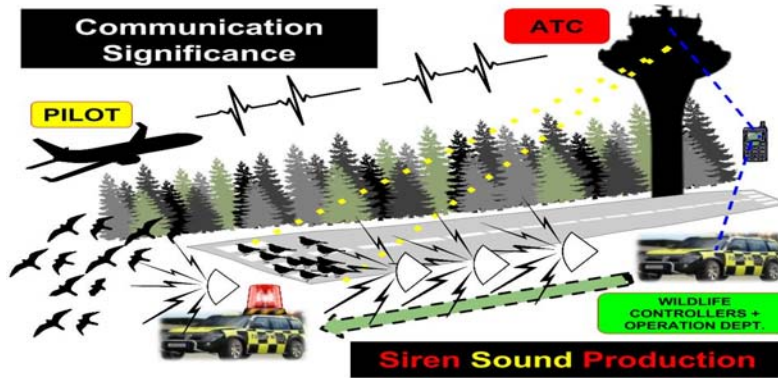


Figure 4

Further information can be found: ICAO Airport Service Manual, part 3, 3.4 Role of Bird/ Wildlife Strike Control Committee- ACI Wildlife Hazard Management Handbook item 2.5

2nd: Wildlife Control Mechanism (*Operational Mechanism*)

Habitat (Wildlife Hazard Attractants) Management Mechanism on/in the Airport Vicinity

- The airport's WHMP should provide details on the actions and procedures necessary to manage both habitat and wildlife given the specific local conditions and considerations. Actions to deal with wildlife on a daily basis starts with patrols and inspections, observation of wildlife and other conditions, making interventions and assessing the response to interventions. It is also crucial to record all actions and observations in order to be able to review the effectiveness of the WHMP and development improvements.
- After working hazard identification and analysis (item 3-1-1) airport operator should have mechanisms to control of wildlife attractants through the following:
 - a. Avoid establishment such kind of wildlife attractants anymore in the airport new projects or expanding.
 - b. Reduce the wildlife attractants from its original source as much as possible.
 - c. Destroying the food chain of such wildlife species at airports by using a series of insecticides, herbicides and rodenticides applications.
 - d. Management of airport's airside ground cover as appropriate with its relevant wildlife species and its behaviours.
 - e. Choosing the optimum way of habitat modification based on the existing and expected wildlife.
 - f. Definitely short grass cover is more convenient for visual and physical access of wildlife control team.
 - g. Eliminate all standing water on an airport to the greatest extent possible.
 - h. Modify waste water oxidation ponds whether by monitoring and dispersing birds regularly to form a wildlife plugged zone (WPZ) or covering it using nets or any other relevant suitable techniques (exclusions techniques).

- i. Proper fencing installation.
- j. Others.

Using Most Suitable and Effective Dispersing Tools

- Repellent and harassment techniques should be used to keep hazardous wildlife away from specific areas on or near an airport. The long-term cost-effectiveness of repelling hazardous wildlife does not compare favourably with habitat modification or exclusion techniques. Wildlife will return as long as the attractant is accessible. However, habitat modification and exclusion techniques will never rid an airport of all hazardous wildlife. Repellent techniques are a key ingredient of any wildlife hazard management plan.
- Repellents work by affecting the animal's senses through chemical, auditory or visual means. Habituation or acclimation of birds and mammals to most mechanical repellent techniques is a major problem. When used repeatedly, without added reinforcement, wildlife soon learns that the repellents or techniques are harmless and the repellents or techniques are ignored.

When Using Repellents, Four Critical Factors should be Remembered:

1. there is no single solution to all problems;
 2. there is no standard protocol or set of procedures that is best for all situations. Repelling wildlife is an art and a science. Motivated, trained and suitably equipped personnel who understand the wildlife on the airport are critical for the successful use of repellents;
 3. each wildlife species is unique and will often respond differently to various repellent techniques. Even within a group of closely related species, such as gulls, the various species will often respond differently to various repellent techniques; and
 4. to lessen habituation to repellent techniques:
 - use each technique sparingly and appropriately when the target wildlife is present;
 - use various repellent techniques in an integrated fashion; and
 - Reinforce repellents with occasional lethal control (only when necessary depredation permits are in place) directed at abundant problem species.
- Advances in electronics, remote sensing and computers have resulted in "intelligent" systems that can automatically dispense repellents (for example, noisemakers, chemical sprays) when targeted wildlife enter selected areas. These devices are used to reduce habituation and increase the effectiveness of other repellent techniques. It should be remembered that automated repellents are not a substitute for trained people on the ground, who can respond appropriately to incursions by various wildlife species, and should be considered only when more traditional methods of control and dispersal have proved ineffective.

Note: for further information can be found: ICAO Airport Service Manual, Part 3, and chapter 8 Wildlife Control and Reduction and ACI Wildlife Hazard Handbook section 4

3.3 WHMP Periodic Evaluation

3.3.1 Purpose:

Aerodromes should have a process to review and evaluate the wildlife management plan to provide safety assurance that the plan is fully effective and correctly implemented. The review should be completed on an annual basis but also must include an on-going review process to ensure that the plans are always current and fully functional at all times.

Procedures to monitor and evaluate the effectiveness of bird or wildlife control strategies might include:

- Airport’s WHMP include wildlife control performance monitoring, measurement and improvement systems;
- Personnel training, competence assessment and appraisal.

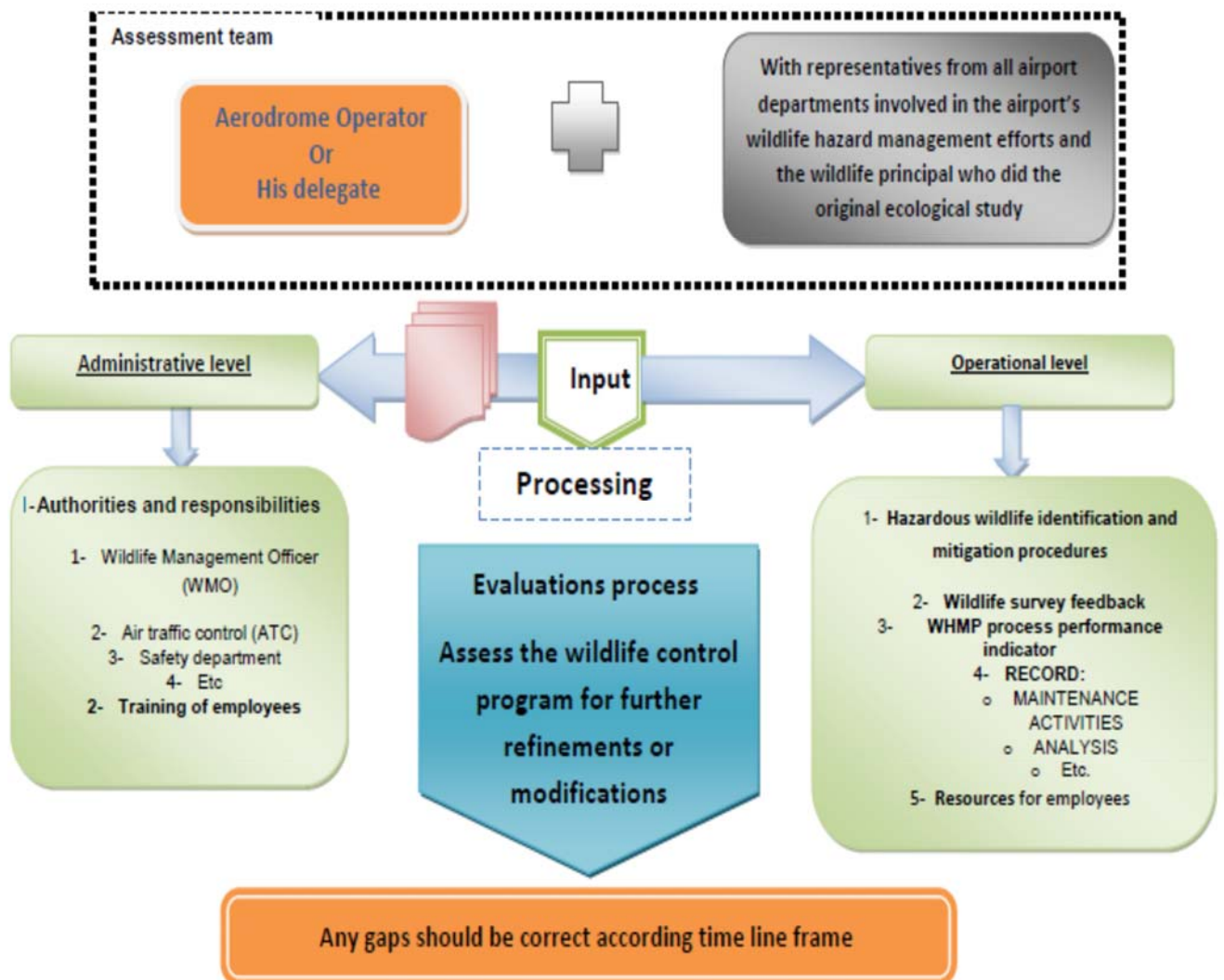


Figure 5 -Evaluation Process

3.4 Evaluation of the Airports Wildlife Hazard Management Program:

3.4.1 Administrative Level

- i. **Evaluation the Authorities** and responsibilities: to ensure that all roles clearly defined and understood by all and the aerodrome personnel understand their roles and responsibilities
- ii. **Evaluation the Training** of employees: to ensure the computability with the training program

Note: For further information about the training program can be found in the ICAO Airport Service Manual, Part 3, Chapter 4 Wildlife Control and Reduction and ACI Wildlife Hazard Handbook Section 5

3.4.2 Operational Level: Assessment should include at least the following:

- i. **Evaluation The Hazardous Wildlife Identification and Mitigation Procedures:** include assessment the records of any habitat modifications and adjacent land use management which will consequently affect the presence of wildlife (time, locations, dates, migratory flyways, numbers, etc....).
- ii. **Wildlife Survey Feedback:** is a valuable tool for aerodromes to ensure their wildlife management and habitat plans are effective, meet all regulations and standards required (ATC, Airlines andetc.).
- iii. **Evaluation the WHMP Process Performance Indicator*:** Performance indicators are critical to determine the need for enhancement or modification. It is also very necessary because actions to reduce one wildlife hazard will inevitably result in improved conditions for some other wildlife species.
 - a- The number of wildlife strikes;
 - b- Strike rate;
 - c- Damage associated with strikes;
 - d- Individual species' hazard assessments;
 - e- Risk rankings for airport; and
 - f- The status of action items that have been recommended in the plan.

**Taken together, these seven measurements will form an effective and objective measurement of performance of the WHMP for airport. The hazard and risk assessment will be updated and compared to the previous assessments in the WHMP every two years (or earlier if there is a significant change in hazards or risk). A discussion of any changes will be provided. Feedback from airport users will be sought and reported in time for each two-year update this will help determine if the wildlife program is being responsive to their needs.*

3.4.3 Evaluation of the Keeping Records:

- a) **Records of wildlife activity**, wildlife strikes, and wildlife management actions.
- b) **Maintenance activities** and any other corrective and preventative actions: keep records of any corrective and preventative actions serving wildlife hazard management and control concept, such actions might be installing or repairing fencing, thinning trees, clearing construction debris, applying pesticides or repellents, conducting grass-height

management, installing netting in hangers or wires over ponds or oxidation tanks, and regarding pavement or grass areas to eliminate standing water.

- c) **Recorded Information Analysis:** the information recorded will be most useful if it is summarized into monthly and annual statistics. The use of computerized database systems customized to provide summaries of wildlife control activities is recommended.

Note: Furthermore, without accurate records and proper evaluation, it might be difficult to justify and defend certain management actions such as wildlife removal.

- d) **Evaluation of Resources for Employees:** Periodic analyses of daily wildlife reports, will reveal:

- The effectiveness of applied control techniques for various wildlife species;
- The effectiveness of different dispersal techniques at different times of the day and under different weather conditions; and
- The amount of time wildlife remains dispersed.

Note: see figure 5 -Evaluation Process

APPENDIX A

WILDLIFE HAZARD MANAGEMENT ASSESSMENT CHECKLIST

Name of Aerodrome:		Inspection Date:				
Name of Operator:		Inspector(s) Name (s):				
Regulation						
	Item	Reg Ref	Yes	No	N/A	Remark
1.	Has Bird/Wildlife Control Officer(s) at the site been appointed and responsibilities assigned?					
2.	Has a training programme been developed to train those involved in Bird/Wildlife Control Programme?					
3.	Have the control officer(s) being trained accordingly?					
4.	Has the Bird/Wildlife Control Co-Coordinating Committee been established with well-defined responsibilities?					
5.	Has a Bird/Wildlife Control Programme (Management Plan) been developed?					
6.	Is level of implementation of measures in control programme (including those below) satisfactory?					
7.	Does the Aerodrome Operator maintain an observation log? Does the content of the log give an indication of the actual status during inspection					
8.	Does the aerodrome operator on a regular basis remove the attraction to birds particularly water, food, nesting sites and resting places?					
9.	Does the operator maintain a wildlife/bird dispersal log? Does the content of the log give an indication of the actual status during inspection?					
10.	Does the Aerodrome Operator regulate the creation of refuse dumps that would attract birds in the vicinity of the aerodrome where the safety of aircraft operations is					
11.	Has a reporting procedure been documented covering all aspects of the Bird/Wildlife Control Programme?					
12.	Does the Aerodrome Operator keep records of timely reports on bird strike incidents or accidents occurring at the aerodrome?					
13.	Does the Aerodrome Operator submit reports to the CAA for onward submission to ICAO on a regular basis, bird strike reports to facilitate effective use of the IBIS programme in accordance with eac139-20?					
14.	Does the operator make available information on the presence of birds and associated hazards to ATC for advising arriving and departing aircrafts?					
15.	Does the Aerodrome Operator take active part in workshops on bird hazard control and reduction organized by ICAO and other relevant bodies for exchange of views and experiences conclusion?					
16.	Has a list of all bird/wildlife attractants at the aerodrome been completed?					
17.	Has a list of all birds/wildlife surrounding the aerodrome been completed?					
18.	Has a Land Use Plan been established with regard to effective land use on and off the aerodrome as it pertains to the bird/wildlife control programme?					
Inspector's Remarks:						
Recommendation:						
Name Of Inspector:		Sign:		Date:		

APPENDIX B

DATA COLLECTION TEMPLATE FOR OBSERVED WILDLIFE

Wildlife Description	Location and Round Figure of No.				Movement period Season/ month
	1st point	2nd point	3rd point	4th point	
<i>White Stork</i>					August
<i>Prey</i>					May- Jun- July
<i>Water Birds</i>					From September
<i>Others</i>					all over the year

APPENDIX C
RISK ANALYSIS

Table Appendix C-1: Probability

Qualitative Definition	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	3
Occasional	Likely to occur sometimes (has occurred infrequently)	2
Remote	Unlikely, but possible to occur (has occurred rarely)	1

Table Appendix C-2: Severity

Qualitative Definition	Meaning	Value
Major Damage	Aircraft may incur damage or structural failure that adversely affect the structure strength, performance, or flight characteristics and that would normally require major repair or replacement of the affected component, or make it inadvisable to restore aircraft to airworthy condition.	C
Damage	Aircraft may incur at least some damage (destroyed, substantial, minor, or unknown) from strike	B
Effect on Flight	Aborted takeoff, engine shutdown, precautionary landing, or other	A

Table Appendix C-3 Probability /Severity

Probability	Severity		
	Major Damage C	Damage B	Effect on Flight A
Frequent 3	3C	3B	3A
Occasional 2	2C	2B	2A
Remote 1	1C	1B	1A

APPENDIX D

**GAP ANALYSIS FOR WILDLIFE HAZARD MANAGEMENT PROGRAMME
IMPLEMENTATION**

Priority Level	Target state	Current State	Reg. Ref.	Remarks
High	Ecological study	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Events and Strikes records	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Other wildlife damaging collision records	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Wildlife species identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Wildlife species numbers and sizes	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Wildlife locations on/in aerodrome vicinity	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Daily and seasonal occurrence records	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Recognizing wildlife attractants	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Most significant wildlife species identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Most potential date and time of event occurrence identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Migratory birds flyways identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Flyway altitude identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Migratory birds flyway interference with aircraft pathway mapping	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Most important wildlife gathering points identification and mapping	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Responsible person determination	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Wildlife controllers determination	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Wildlife controllers qualifications and training requirements identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Providing the needed training for both wildlife controller and other airport personnel	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Wildlife attractants modifications procedures identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Individual roles and responsibilities assignment	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Resources identification	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Suitable wildlife control strategies determination	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
High	Suitable wildlife control measures (Monitoring and Dispersing tools) determination	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Daily inspection checklist preparation	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Weekly inspection checklist preparation	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Monthly inspection checklist preparation	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Actions taken records	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Wildlife hazard management and control internal committee records	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Wildlife hazard management and control internal committee recommendations and enforcement follow-up sheets	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	Wildlife hazard management and control national committee records	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		

Priority Level	Target state	Current State	Reg. Ref.	Remarks
Medium	Wildlife hazard management and control national committee recommendations and enforcement follow-up sheets	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	WHMP implementation evaluation forms	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		
Medium	WHMP evaluation forms for its effectiveness	<input type="radio"/> yes <input type="radio"/> partial <input type="radio"/> no		

APPENDIX E

KEY ROLES AND RESPONSIBILITIES

Title	Key WHMP Responsibilities
Airport Manager	<ul style="list-style-type: none"> • Implementation of this WHMP; • Acquisition of the various permits; • Provision of training and awareness programs; • Review and submission of the annual strike reports and two year updates.
Assistant Manager	<ul style="list-style-type: none"> • Coordinating, supervising and the overall management of the WHMP; • Nomination of the key Wildlife Management Officer (WMO); • Co-ordination of training, safety assurance; • Ensuring that the necessary equipment is available.
Wildlife Management Officer (WMO)	<ul style="list-style-type: none"> • Maintenance of the Wildlife Management Log (e.g., including strike data, details on wildlife numbers and activity); • WHMP measures undertaken, firearm use details; • details on the use of lethal reinforcement and monthly summaries); • Co-ordination of the monitoring program; • Preparation of the annual strike report; • Ensuring that Airport operations are consistent with the requirements of the WHMP; • Ensuring that the appropriate permits are current and present on-site; • Undertaking deterrent activities; • Ensuring all activities are undertaken following standard practices and safety protocols; and • identification of equipment, resource and training needs.
Back-up to WMO	<ul style="list-style-type: none"> • Filling in for WMO during vacations, lunch, sick time etc.
Air traffic Control (ATC)	<ul style="list-style-type: none"> • Informing wildlife hazards controllers, environmental dept. and operations dept. in case of observing any of these birds and/or wildlife gathering on/in airport vicinity or when receiving any relevant notification from pilot. • Warning pilots in case of wildlife observations (risky operating environment) and hazards expectation. • Report any unsafe conditions including hazardous wildlife on or in airport vicinity to the appropriate airport personnel anytime they are observed. • Actively attend the local wildlife hazard control committee meetings and any other relevant meetings.
Safety Department	<ul style="list-style-type: none"> • Receiving all wildlife strikes and events with the aim of risk assessment formation to ease the future forecasting based on accurate database and risk assessment strategy. • Actively attend the local wildlife hazard control committee meetings and any other relevant meetings

Title	Key WHMP Responsibilities
<p>Maintenance Department</p>	<ul style="list-style-type: none"> • Periodical inspection of the wildlife attractants (such as ponds, transfer stations and water treatment facilities) or airport infrastructure (such as fence) which ease the wildlife invasion. • Corrective maintenance actions and preventative maintenance actions to be taken for wildlife hazards management and control verification.
<p>Environmental Department</p>	<ul style="list-style-type: none"> • Receiving wildlife strike reports from the wildlife hazard coordinator or wildlife hazards controllers. • Wildlife existence notification receiving from ATC and then verification of wildlife hazards controllers moving to the place of wildlife existence. • Database formation including wildlife species, numbers, sizes, date and time of existence, local movements, behaviours, the most suitable way of dispersing, etc... • Wildlife hazards management plan evaluating for effectiveness and verification of its compliance with the original wildlife hazard assessment (Ecological study). • Preparing under direct supervision of aerodrome operator for the local wildlife hazards control and management committee and other relevant meetings. • Follow-up decisions and recommendations taken by the mentioned above committee.
<p>Other governmental municipalities (such as agriculture offices/corporations, solid waste and sewage disposal offices / corporations, state national environmental offices, natural reserves corporations, defense, representatives of the major airlines using airport, even the private sectors located in airport vicinity and others)</p>	<ul style="list-style-type: none"> • Advance cooperation and coordination with airport management regarding land use planning for those located in airport vicinity. • Exchange information on research and development in airport wildlife control. • Providing and updating much relevant information for those in the aviation community.

APPENDIX F BIRD STRIKE REPORTING FORM

<i>Send to:</i> _____																																																										
Operator _____ Aircraft Make/Model _____ Engine Make/Model _____ Aircraft Registration _____ Date day <input type="text"/> month <input type="text"/> year <input type="text"/> Local Time <input type="text"/> dawn <input type="checkbox"/> day <input type="checkbox"/> dusk <input type="checkbox"/> night <input type="checkbox"/> Aerodrome Name _____ Location if En Route _____ Height AGL _____ ft Speed (IAS) _____ kt	Effect on Flight none <input type="checkbox"/> penetration of airframe <input type="checkbox"/> aborted take-off <input type="checkbox"/> vision obscured <input type="checkbox"/> precautionary landing <input type="checkbox"/> engines shut down <input type="checkbox"/> forced landing <input type="checkbox"/> engine ingestion <input type="checkbox"/> fire <input type="checkbox"/> engine uncontained failure <input type="checkbox"/> penetration of windshield <input type="checkbox"/> other (specify) <input type="checkbox"/>																																																									
Phase of Flight parked <input type="checkbox"/> en route <input type="checkbox"/> taxi <input type="checkbox"/> descent <input type="checkbox"/> take-off run <input type="checkbox"/> approach <input type="checkbox"/> climb <input type="checkbox"/> landing roll <input type="checkbox"/>	Sky Condition no cloud <input type="checkbox"/> some cloud <input type="checkbox"/> overcast <input type="checkbox"/>																																																									
Part(s) of Aircraft <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Struck</th> <th style="text-align: center;">Damaged</th> </tr> </thead> <tbody> <tr><td>radome</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>windshield</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>nose (excluding above)</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>engine no. 1</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>2</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>3</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>4</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>propeller</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>wing/rotor</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>fuselage</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>landing gear</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>tail</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>lights</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>Pilot/static head</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>antenna</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>tail rotor</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>helicopter transmission</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> <tr><td>other (specify)</td><td align="center"><input type="checkbox"/></td><td align="center"><input type="checkbox"/></td></tr> </tbody> </table>		Struck	Damaged	radome	<input type="checkbox"/>	<input type="checkbox"/>	windshield	<input type="checkbox"/>	<input type="checkbox"/>	nose (excluding above)	<input type="checkbox"/>	<input type="checkbox"/>	engine no. 1	<input type="checkbox"/>	<input type="checkbox"/>	2	<input type="checkbox"/>	<input type="checkbox"/>	3	<input type="checkbox"/>	<input type="checkbox"/>	4	<input type="checkbox"/>	<input type="checkbox"/>	propeller	<input type="checkbox"/>	<input type="checkbox"/>	wing/rotor	<input type="checkbox"/>	<input type="checkbox"/>	fuselage	<input type="checkbox"/>	<input type="checkbox"/>	landing gear	<input type="checkbox"/>	<input type="checkbox"/>	tail	<input type="checkbox"/>	<input type="checkbox"/>	lights	<input type="checkbox"/>	<input type="checkbox"/>	Pilot/static head	<input type="checkbox"/>	<input type="checkbox"/>	antenna	<input type="checkbox"/>	<input type="checkbox"/>	tail rotor	<input type="checkbox"/>	<input type="checkbox"/>	helicopter transmission	<input type="checkbox"/>	<input type="checkbox"/>	other (specify)	<input type="checkbox"/>	<input type="checkbox"/>	Precipitation fog <input type="checkbox"/> rain <input type="checkbox"/> snow <input type="checkbox"/>
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Damage (aircraft) royed <input type="checkbox"/> substantial <input type="checkbox"/> minor <input type="checkbox"/> none <input type="checkbox"/> unknown <input type="checkbox"/>	Injury (index of) fatal <input type="checkbox"/> serious <input type="checkbox"/> minor <input type="checkbox"/> none <input type="checkbox"/> unknown <input type="checkbox"/>																																																									
	Bird Species Confirmed Bird Species _____ Number of Birds <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">Seen</th> <th style="text-align: center;">Struck</th> <th></th> </tr> </thead> <tbody> <tr> <td>1</td> <td align="center"><input type="checkbox"/></td> <td align="center"><input type="checkbox"/></td> <td>A</td> </tr> <tr> <td>2-10</td> <td align="center"><input type="checkbox"/></td> <td align="center"><input type="checkbox"/></td> <td>B</td> </tr> <tr> <td>11-100</td> <td align="center"><input type="checkbox"/></td> <td align="center"><input type="checkbox"/></td> <td>C</td> </tr> <tr> <td>more</td> <td align="center"><input type="checkbox"/></td> <td align="center"><input type="checkbox"/></td> <td>D</td> </tr> </tbody> </table>		Seen	Struck		1	<input type="checkbox"/>	<input type="checkbox"/>	A	2-10	<input type="checkbox"/>	<input type="checkbox"/>	B	11-100	<input type="checkbox"/>	<input type="checkbox"/>	C	more	<input type="checkbox"/>	<input type="checkbox"/>	D																																					
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	Size of Birds small <input type="checkbox"/> medium <input type="checkbox"/> large <input type="checkbox"/>																																																									
	Pilot Warned of Bird yes <input type="checkbox"/> no <input type="checkbox"/>																																																									
	Remarks (describe damage, injuries and other pertinent information) <div style="border: 1px solid black; height: 60px; width: 100%;"></div>																																																									

Reported by _____ Report Number: _____

THIS INFORMATION IS REQUIRED FOR AVIATION SAFETY