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WILDLIFE CONTROL PROGRAMME

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Aerodrome Safety Publications are published by the CAAS for purposes of promulgating supplementary guidance materials to the Standards and Recommended Practices (SARPs) in the Manual of Aerodrome Standards. The publications are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with SARPs. Aerodrome Safety Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

1 Purpose

- 1.1 The purpose of this Aerodrome Safety Publication (ASP) is to promulgate supplementary guidance material to aerodrome operators on the implementation of a wildlife control programme. This ASP provides guidance on what is acceptable to demonstrate compliance with the regulatory requirements in Section 13.2.4 of the Manual of Aerodrome Standards (MOAS).
- 1.2 This Publication recommends and explains the components of a wildlife control programme.
- 1.3 The appendices provide guidance to aerodrome operators in establishing an effective wildlife control programme at their respective aerodromes. Appendix A contains a sample flowchart on the sequence of events that should happen and the recommended forms to use after a wildlife strike or sighting. Appendix B includes a brief description of the risk management related to a wildlife control programme and some suggested factors to be considered for risk assessment matrix. Appendix C contains some techniques used by airports worldwide to effectively deter/reduce the wildlife population within the aerodrome. Aerodrome operators may choose to use these appendices for their wildlife control programme.

2 Applicability

- 2.1 This ASP applies to all aerodrome operators certified under paragraph 67 of the Singapore Air Navigation Order (ANO). Aerodrome operators should examine each item carefully, by considering the size, complexity and scope of operations at the aerodrome to determine what applies.

3 Cancellation

- 3.1 This ASP supersedes ASP 03/2009.

4 Effective Date

- 4.1 This ASP takes effect on 5 April 2017.

5 Introduction

- 5.1 Wildlife such as birds has been a potential hazard to aircraft since the beginning of air travel. Bird strikes were a minor risk in the early days as there were few aircraft in the sky traveling at relatively low speeds. Damage to aircraft was, therefore, limited to shattered windshields, dented leading edges, and some damage to the fuselage. The cost of repairs was small and aircraft operators and aerodrome authorities accepted wildlife strikes as a normal hazard of flying.

- 5.2 With time, the speed of aircraft increases and engine noise levels dropped with the development of newer generation turbine engines. Aircraft simply became too quick and too quiet for birds to sense and avoid. Birds inadvertently became a serious threat to aircraft safety as strikes became more frequent and more serious.
- 5.3 Birds however are not the only wildlife problem for aircraft. Animals such as dogs wandering onto runways can create serious problems for departing and landing aircraft. Other than economic cost of wildlife strikes, the cost in human lives lost when aircraft crashes as a result of strikes amplifies the need for effective management of the wildlife strike problem.
- 5.4 A good wildlife control programme depends on good reporting. Data may come from wildlife sightings, maintenance problems, wildlife strikes and wildlife control activities. Review of this data identifies problems at the site and may indicate the effectiveness of current wildlife controls.
- 5.5 A wildlife strike has occurred when:
- (a) A pilot reports a wildlife strike; or
 - (b) Maintenance personnel report that aircraft damage is due to a wildlife strike; or
 - (c) Aerodrome personnel report seeing a wildlife strike; or,
 - (d) Aerodrome personnel find wildlife remains on airside areas on or in the vicinity of a runway and no other cause of death is identified; or
 - (e) An animal's presence on the aerodrome had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal).

6 Objective

- 6.1 The objective of a wildlife control programme is for aerodrome operators to assess the wildlife activity, the impact of wildlife strikes and reduce the number of wildlife strikes at the aerodrome. The following are the recommended elements for such programmes:
- (a) Roles and responsibilities of personnel;
 - (b) Training programme for personnel;
 - (c) Reporting procedure;
 - (d) Analysis of wildlife strike data;
 - (e) Risk management and mitigation;
 - (f) Evaluating of wildlife control programme
 - (g) A list of all wildlife attractants at the aerodrome;
 - (h) A list of all wildlife attractants surrounding the aerodrome; and

- (h) Techniques to curb the increase in the wildlife population

7 Roles and responsibilities of personnel

- 7.1 Each aerodrome should implement a wildlife control programme tailored to conditions on the site, with assistance from different divisions within the aerodrome operator organisation and other external agencies/contractors, if any. Aerodrome personnel will be responsible for the implementation of the programme. This includes:
- (a) Acquisition of the various permits such as permits from relevant authorities for the culling of wildlife and handling of firearms;
 - (b) Provision of training and awareness programmes;
 - (c) Review and submission of the wildlife strikes/wildlife sighting reports;
 - (d) Data analysis of the wildlife strike/sighting reports; and
 - (e) Periodic updates of the programme.
- 7.2 Senior management, or their designate, should be responsible for the overall management of the wildlife control programme on a long-term as well as a daily basis at the site-specific level. This should include the nomination of the Wildlife Management Officers, coordination of training, safety assurance and ensuring that the necessary resources are available.
- 7.3 Wildlife Management Officers should ensure that patrol of the fence line i.e. the boundaries of the aerodrome, is done regularly. Any washouts, breaks, or other holes in the fence should be fixed as soon as they are discovered to prevent other wildlife species, especially dogs from entering the airside.

The wildlife management officers should be responsible for:

- (a) Establishing and maintaining the Wildlife Management Log (e.g. strike data, details on wildlife numbers and activity; wildlife control measures undertaken, firearm use details; details on the use of lethal reinforcement and monthly summaries);
- (b) Coordinating the entire monitoring program (e.g., including wildlife hazard consultant (ornithologist), control tower, airfield inspection team and external agencies/contractors including aircraft operators);
- (c) Filing of autopsy, wildlife strike and wildlife sighting reports;
- (d) Preparing the wildlife strike report and submit to the Aerodrome and Air Navigation Services Regulation (AAR) Division for inclusion in the ICAO Bird Information System (IBIS);

- (e) Ensuring that aerodrome operations are consistent with the requirements of the wildlife control programme;
- (f) Ensuring that the appropriate permits such as those stated in Para 7.1(a) are current and present on-site;
- (g) Undertaking deterrent activities;
- (h) Ensuring all activities undertaken follow strictly to the aerodrome Safety Management System (SMS) guidelines; and
- (i) Identifying equipment, resources and training needs of relevant personnel.

7.4 In addition, wildlife issues should be discussed at an appropriate forum attended by representatives from the various divisions involved in wildlife control, airport planning, maintenance and operations. It should also include air traffic services, airline operators and other external agencies/contractors that may affect wildlife control. The forum can be used to review wildlife strike/wildlife sighting reports, safety indicators, and periodic activity records to determine effective control measures to curb wildlife activity in and within the vicinity of the aerodrome. It is also a channel to discuss and to make inter-divisional decisions arising from the wildlife activity issues.

8 Training programme for personnel

8.1 The following areas of training and levels of skill are suggested for personnel, especially the wildlife management officers involved in the wildlife control programme:

- (a) Bird Identification

8.2 There are many species of birds that reside in or migrate through Singapore. Some species are present in an area all year and others only in migration (September to April). All these species have unique vocalizations, behaviours and habitat preferences. Knowledge of these unique characteristics is useful to the officers in field identification. Thus, to become an expert in field identification of all bird species at a location requires many years of training and practice. Bird species may also be different in different aerodromes, making bird identification more challenging for the personnel. Personnel require basic training, including on-the-job training so that they can identify these bird species found in the aerodrome.

8.3 Binoculars are essential for detailed, close-up observation. They are also useful for the detection and identification of birds at a distance.

8.4 Every personnel should also be equipped with a wildlife identification field guide, to be carried in the vehicle while on patrol. As a learning aid, personnel should be encouraged to make annotations in their field guides regarding behaviour or appearance next to identified wildlife.

(b) Biology and behaviour of bird species

8.5 In addition to learning to identify the birds at an aerodrome, personnel should have some understanding of the biology and behaviour of these species. Understanding the daily movement patterns between roosting, feeding and loafing areas in relation to the aerodrome of the species of bird is one of the examples. This information will make the job of the personnel more interesting and be useful in anticipating problems and deploying control measures more effectively.

(c) Other wildlife species identification

8.6 Other wildlife species commonly found in Singapore aerodromes are dogs, cats, snakes and tortoises. Personnel should be trained to identify, not only by sight but also by signs (e.g. tracks, trails in grass and fecal material).

(d) Documentation and Strike Reporting

8.7 A key component of a wildlife control programme is to develop a system to document the daily activities of the wildlife management officers involved, log information about wildlife numbers and behavior at the aerodrome, and record all wildlife strikes. Reporting is necessary as a source of data for analysis. This information is extremely useful during periodic evaluations of the wildlife control programme and when revisions to the plan are proposed. Personnel should be instructed on the importance of documentation and trained to record such information in a standardized format.

8.8 Appendix A shows a sample of the flowchart of the reporting procedures for reporting of wildlife strikes and wildlife sighting by personnel and their respective forms. Aerodrome operators should have their own reporting procedures in place.

9 Analysis of wildlife strike data

9.1 The review of wildlife strike data identifies problems at the site and may indicate the effectiveness of current wildlife control measures. It is important to note that due care must be exercised while interpreting the data collected. The straightforward total number of strikes at an airport may not be a good indicator of risk, and examination of the data by species struck and the distinguishing of multiple from single strikes are critical. If an increase in recorded strikes is attributable to an increase in

incidents caused by encounters with single small wildlife, whereas the number of strikes involving large wildlife species and/or flocks of wildlife is falling, then this may well be indicative of both better wildlife control and better reporting of strikes.

- 9.2 Actual wildlife strikes may not provide the whole picture. The recording (via routine safety reports of occurrences) of potentially hazardous wildlife activity or near miss events can also be very useful. Such data should also be analysed to give a better conclusion on the wildlife activity in and within the vicinity of the aerodrome.
- 9.3 Wildlife strike database information should be analyzed to determine a number of trends including but not limited to:
- (a) Wildlife species that create problems overall and at particular locations,
 - (b) Problematic times of the day and year,
 - (c) Yearly strike trends by location,
 - (d) Phase of flight when strikes are most likely to occur,
 - (e) Types of aircraft most likely to be struck,
 - (f) Parts of the aircraft most likely to be struck,
 - (g) Effects of strikes on aircraft,
 - (h) Percentage of strikes that are damaging and affect flight,
 - (i) Costs associated with strikes, and
 - (j) Altitude at which strikes occur.
- 9.4 It may also be important to periodically summarise information from the daily wildlife activities log and wildlife strikes records to provide baseline data for analysing and evaluating the wildlife control program. A logical approach is to conduct monthly summaries that are then incorporated into a quarterly or semi annual report. These summaries do not need to be complex but must reflect the level of activity for the common control techniques deployed. For example, monthly summaries of runway sweeps to clear birds, distress call deployments, number of wildlife removed may be useful.

10 Risk management and mitigation

- 10.1 A hazard is a condition with the potential to cause injury to personnel or damage to equipment or structures. Reducing exposure to hazards is a component of risk management.
- 10.2 Risk is the likelihood of injury or loss occurring, which is a function of exposure to the hazards, as well as the likelihood of a wildlife strike occurring and the magnitude or severity of the wildlife strike. It follows

then, that high risk species are those that are most frequently involved in strikes, as well as those that cause the greatest damage.

- 10.3 Risk assessment is an important part of a wildlife control programme because it serves to ensure that wildlife management activities are directed at the species that create the highest risk, in a prioritised fashion.
- 10.4 Risk is strongly influenced by the type of aircraft and their operations. The likelihood of a catastrophic wildlife strike accident occurring with a small piston-powered aircraft is much less than with turbine powered aircraft.
- 10.5 Appendix B shows some suggested factors that should be included into a risk assessment matrix that could be used for the wildlife control programme. Aerodrome operators are strongly encouraged to have their own risk assessment put in place. They should, at the same time, exercise due care to see what applies to their aerodrome, especially the different species of wildlife found on or in the vicinity of the aerodrome.
- 10.6 Once the risk assessment is completed, the aerodrome operator has to develop mitigating measures to deal with the risks identified. Aerodrome operators should ensure that the measures are reviewed periodically so that the level of effectiveness is maintained at an acceptable level defined by the aerodrome operator. (Guidance material on risk assessment is contained in ICAO Safety Management Manual, Doc 9859)

11 Evaluating Wildlife Control Programme

- 11.1 The following questions are designed to assist in determining if there is an effective wildlife control programme in place at an aerodrome.
 - (a) Has a wildlife control programme been developed?
 - (b) Has the wildlife control programme been implemented?
 - (c) Has a wildlife management officer at site been appointed and responsibilities assigned?
 - (d) Has a training programme been developed to train those involved in the wildlife control programme?
 - (e) Has a wildlife control control co-ordinating forum been established with well-defined responsibilities?
 - (f) Has a reporting procedure been developed covering all aspects of the wildlife control programme?
 - (g) Has a land-use plan been established with regard to effective land-use on and off the aerodrome as it pertains to the wildlife control programme?
 - (h) Has a list of all wildlife attractants at the aerodrome been completed and updated?

- (i) Has a list of all wildlife attractants surrounding the aerodrome been completed and updated?
 - (j) Have wildlife control methods been researched and implemented at the aerodrome?
- 11.2 Wildlife species on and in the vicinity of aerodromes are constantly changing in response to changes in land use, state management policies, and environmental factors. In addition, wildlife might adapt or habituate to control strategies that were once effective, or they might develop new behavioral or feeding patterns on or near the aerodrome. New wildlife control technologies might become available, or established products or techniques might be withdrawn or banned. There might also be changes in wildlife control and management personnel at an aerodrome.
- 11.3 Thus, once a wildlife control programme is in place, there is a need to develop a process to evaluate the programme at least annually and update the programme as needed.
- 11.4 The foundation for these evaluations is the maintenance of consistent records of wildlife control activities and wildlife strikes. Consistent records permit easy compilation of events and activities into monthly and annual statistical and narrative summaries. Once these summaries are available, objective examinations and comparisons can be made of trends in strikes, wildlife activities, control methods deployed, and other factors.

12 A list of all wildlife attractants at the aerodrome

- 12.1 Wildlife attractants at the aerodrome should be properly identified in a wildlife control programme. The aerodrome operator should understand the behaviour of the wildlife and the reasons for them to come to the aerodrome. This would definitely be of a great help to reduce the number of wildlife strikes and wildlife sightings. The following is a list (non-exhaustive) of potential wildlife attractants that may be found at the aerodrome:
- (a) Grass/Turf areas;
 - (b) Water bodies, ditches and drains;
 - (c) Other food sources such as food and beverages stores, food disposable bins;
 - (d) Shelter in hangars and in nooks of other buildings; and
 - (e) Trees and vegetation

13 A list of all wildlife attractants surrounding the aerodrome

- 13.1 In order to have a successful wildlife control programme, the aerodrome operators should also identify wildlife attractants surrounding the aerodrome and notify the relevant authorities to remove the attractants if

necessary. These wildlife attractants are often overlooked as there may seem to be no direct relationship between the number of wildlife strikes/wildlife sightings and the wildlife attractants surrounding the aerodrome. The following is a list (non-exhaustive) of potential wildlife attractants that may be found at the surroundings of the aerodrome:

- (a) Food sources;
- (b) Dumping facilities
- (c) Favourable roosting and nesting areas; and
- (d) Trees and vegetation.

14 Techniques to curb the increase in the wildlife population

- 14.1 A successful wildlife control programme should also include techniques to curb wildlife from coming to the aerodrome. There are passive and active techniques used all over the world and some of these techniques are listed in Appendix C. Aerodrome operators may use this list as a guide to select the appropriate techniques for their aerodromes.
- 14.2 In addition, for the long-term, aerodrome operators should be well informed on the latest technique available in the industry and study its suitability and effectiveness. This would mean that the aerodrome operators need the support of the senior management team to ensure that the wildlife hazard issue can be holistically addressed.

15 Reference

Singapore Air Navigation Order (ANO);
Manual of Aerodrome Standards (MOAS);
ICAO Annex 14, Volumes I;
Doc 9137 – Airport Services Manual, Part 3, Wildlife Control and Reduction;
Doc 9859 – ICAO Safety Management Manual

16 Queries

If there are any queries with regard to this Aerodrome Safety Publication, please address them to:

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Appendix A – Flowchart for reporting of wildlife strike and sighting

A sample of the reporting flowchart for wildlife strike and sighting and the recommended forms are as shown below:

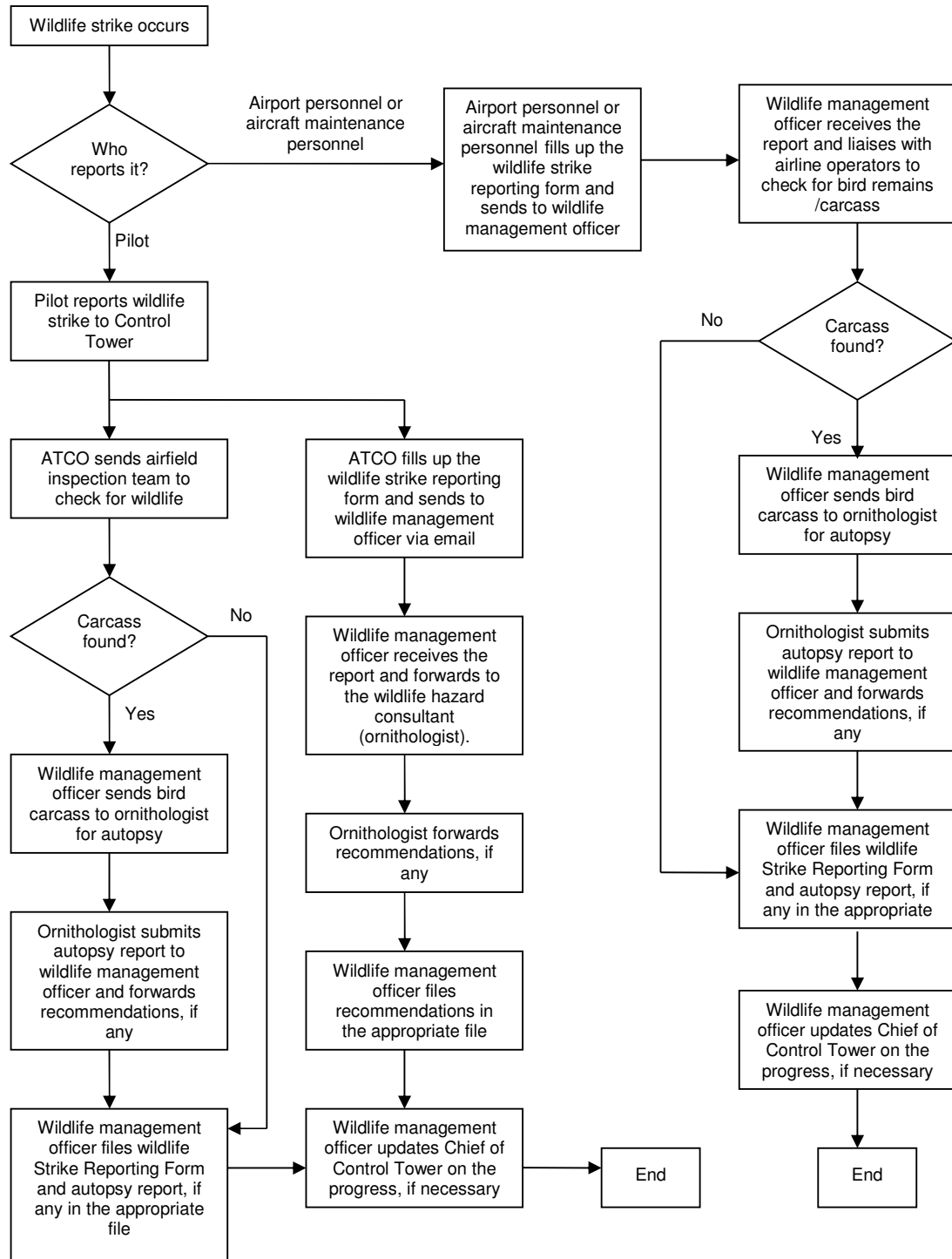


Figure 1: A Sample Flowchart for Reporting of Wildlife Strike

WILDLIFE STRIKE REPORTING FORM					
(This information is required for aviation safety)					
OPERATOR or CALL SIGN			AIRCRAFT TYPE []		
ENGINE TYPE []			AIRCRAFT REGISTRATION []		
DATE	Day []	Month []	Year []	TIME OF INCIDENT [] (UTC) []	
				Dawn <input type="checkbox"/>	Day <input type="checkbox"/> Dusk <input type="checkbox"/> Night <input type="checkbox"/>
AERODROME NAME [Aerodrome]			RUNWAY USED [RWY]		
HEIGHT AGL [Height]			APPROX. GEOGRAPHICAL LOCATION		
SPEED (IAS) kt					
PHASE OF FLIGHT		<input type="checkbox"/> Unknown	<input type="checkbox"/> En-route	SKY CONDITION	
		<input type="checkbox"/> Taxi	<input type="checkbox"/> Descend	<input type="checkbox"/> No Cloud	
		<input type="checkbox"/> Take-off run	<input type="checkbox"/> Approach	<input type="checkbox"/> Some Cloud	
		<input type="checkbox"/> Climb	<input type="checkbox"/> Landing Roll	<input type="checkbox"/> Overcast	
				PRECIPITATION	
				<input type="checkbox"/> Fog	
				<input type="checkbox"/> Rain	
PART(S) OF AIRCRAFT					
		Struck	Damage		
Radome	<input type="checkbox"/>	<input type="checkbox"/>		WILDLIFE SPECIES * []	
Windshield	<input type="checkbox"/>	<input type="checkbox"/>			
Nose (excluding above)	<input type="checkbox"/>	<input type="checkbox"/>		NUMBER OF WILDLIFE SPECIES	
Engine No. 1	<input type="checkbox"/>	<input type="checkbox"/>		Seen	Struck
2	<input type="checkbox"/>	<input type="checkbox"/>			
3	<input type="checkbox"/>	<input type="checkbox"/>		SIZE OF WILDLIFE SPECIES	
4	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Small	<input type="checkbox"/> Medium <input type="checkbox"/> Large
Propeller	<input type="checkbox"/>	<input type="checkbox"/>			
Wing/Rotor	<input type="checkbox"/>	<input type="checkbox"/>		PILOT WARNED OF WILDLIFE SPECIES	
Fuselage	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/> Yes	<input type="checkbox"/> No
Landing gear	<input type="checkbox"/>	<input type="checkbox"/>		LIGHTS USED :	
Tail	<input type="checkbox"/>	<input type="checkbox"/>		Landing <input type="checkbox"/> Yes <input type="checkbox"/> No	
Lights	<input type="checkbox"/>	<input type="checkbox"/>		Strobe Anti-Collision <input type="checkbox"/> Yes <input type="checkbox"/> No	
Other	<input type="checkbox"/>	<input type="checkbox"/>			
Specify: [Specify here]					
EFFECT ON FLIGHT			REMARKS		
<input type="checkbox"/> None					
<input type="checkbox"/> Aborted take-off					
<input type="checkbox"/> Precautionary landing					
<input type="checkbox"/> Engines shut down					
<input type="checkbox"/> Other (Specify)					
* Send all wildlife species remains to :					

Figure 2: Wildlife strike reporting form

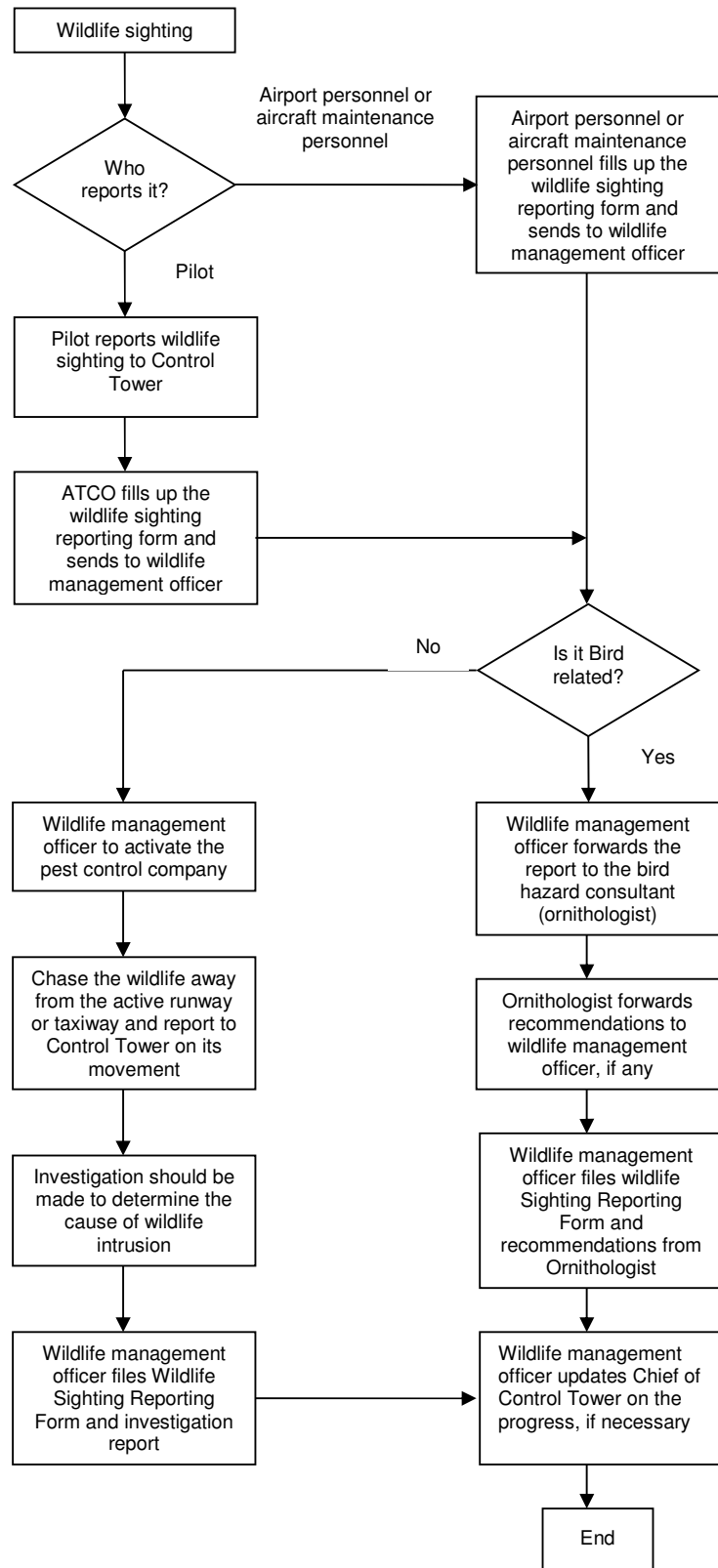


Figure 3: A Sample Flowchart for Reporting of Wildlife Sighting

WILDLIFE SIGHTING REPORTING FORM			
(This information is required for aviation safety)			
OPERATOR OR CALL SIGN		AIRCRAFT TYPE	
ENGINE TYPE		AIRCRAFT REGISTRATION	
DATE (UTC)		TIME OF INCIDENT	UTC
		Day	
RUNWAY USED		APPROX. GEOGRAPHICAL LOCATION	
HEIGHT AGL			
SPEED(IAS)			
PHASE OF FLIGHT		SKY CONDITION	
		PRECIPITATION	
PART(S) OF AIRCRAFT			
		BIRD SPECIES *	
Radome			
Windshield		NUMBER OF BIRDS	Seen :
Nose(excluding above)			Struck:
Engine No.1		SIZE OF BIRD	
2			
3		PILOT WARNED OF BIRDS	
4			
Propeller		LIGHTS USED:	
Wing/Rotor		Landing	
Fuselage		Strobe Anti-Collision	
Landing gear			
Tail			
Light			
Other			
Specify			
EFFECT ON FLIGHT		Remarks	
Watch Manager Name			
Created By			
Modified By			

Figures 4: Wildlife sighting reporting form

Appendix B – Risk management

NOTE: The purpose of this part is to provide aerodrome operators with a recommended list of factors to be considered in risk assessment of the wildlife control programme. Each wildlife control programme is unique to the particular aerodrome and it might require some specific types of risk management and measures to curb the increase in the number of wildlife strikes and wildlife sightings. Aerodrome operators must fully understand these considerations in order to implement the wildlife control programme effectively.

In risk management, aerodrome operators should consider the identification of hazards (which are wildlife-related hazards), its consequences (which may be aircraft damages, loss of lives, etc) and the related risks (in terms of probability and severity) involved. This is in line with the aerodrome Safety Management System (SMS) that shall be put in place by the aerodrome operator – an aerodrome certification requirement.

A risk assessment matrix should be used in a wildlife control programme. Suggested factors that should be considered in a risk assessment matrix are as follow:

- (a) Types of aircraft/aircraft classification;
- (b) Volume of air traffic movement;
- (c) Wildlife species; and
- (d) Size of wildlife/wildlife movements.

With the risk assessment matrix put in place, the risk indexes should be classified into different categories for example, acceptable, tolerable and intolerable. An example of such classification and its suggested criteria is as shown in the Table 1 below:

Category	Suggested Criteria
Intolerable region	The consequence is unacceptable under the existing circumstances.
Tolerable region	Mitigating measures should be taken to reduce the probability or the severity of the consequence. This may often require senior management decision.
Acceptable region	The consequence is extremely improbable or not severe enough to be of concern.

Table 1: A Sample of Risk Categories

Aerodrome operators may modify this table to suit their own wildlife control programme. In addition, more guidance material on risk assessment is contained in ICAO Safety Management Manual, Doc 9859.

Appendix C – Suggested list of techniques commonly used

There are numerous techniques used by different aerodromes all over the world to curb the increase in the bird population. Generally, these techniques can be divided into 2 categories: Passive techniques and Active techniques.

Passive techniques

Passive techniques are generally those that alter habitat or permanently exclude entry (See Table 1 below). Wildlife management officers should know very well which measures are applicable and effective for their aerodrome.

Examples	Suggested Approaches
Grass/Turf areas	<ul style="list-style-type: none"> • Manage height according to hazards at the airport • Adaptive management, experimental manipulation at individual aerodrome
Buildings	<ul style="list-style-type: none"> • Ensure entry holes/crevices blocked, screened, netting • Influence design of new buildings, slope ledges • Porcupine wire, electric shocking, sticky caulking
Open water, ponds, ditches, drains, poorly drained areas	<ul style="list-style-type: none"> • Drain, improve drainage • Fill, over-wire, netting, BirdBalls™ • Grade slopes steeply, remove vegetation
Shrubs, trees, brush, hedges, woodland	<ul style="list-style-type: none"> • Remove, including undergrowth and understorey layers • Reduce biodiversity, habitat niches
Infield perching features	<ul style="list-style-type: none"> • Remove • Apply spikes when required
Waste storage	<ul style="list-style-type: none"> • All disposal containers must be wildlife proof • Eliminate dumps on the airport
Fencing	<ul style="list-style-type: none"> • Proper fencing • Regular inspection to fix any washouts, holes
Outdoor picnic areas	<ul style="list-style-type: none"> • Signage • Provide wildlife proof garbage containers
Aircraft	<ul style="list-style-type: none"> • Ensure that bird nesting does not occur within parked aircraft

Table 1: A Sample of Passive Techniques

Active techniques

Active techniques fall into two major subgroups. There are:

- (a) Dispersal (various kinds of deterrents, hazing); and
- (b) Removal (live capture, killing)

Birds often habituate to non-lethal threats within a few weeks, hence in the long-term, dispersal techniques are seldom effective unless a clear and present danger is presented to the birds (e.g. with a dog or live gunshot). Table 2 below

shows some examples of active techniques that can be used to deter/reduce birds from coming to the aerodrome.

	Technique
Non-lethal	Pyrotechnics
	Gas cannons
	Report Shells
	Lasers
	Falconry
	Border Collies
	Live trapping
	Chemical – irritants
	Playback of distress calls – remote system
	Playback – mobile
	Flags
	Dead specimen birds
	Chemical - behavioural repellents
	Radio-controlled models
Lethal	Lethal trapping
	Chemical – lethal control
	Chemical – Benomyl/Tersan fungicide
	Earthworm sweeping
	Surfactant water sprays
	Live-ammunition shooting

Table 2: A Sample of Active Techniques