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Technical Publication – TP 20

Aerodrome Wildlife Strike Hazard Management

Guidance Material

Foreword

This Technical Publication is intended to provide guidance material to aerodrome operators and presents industry-accepted "good practice" with regard to wildlife management and hazard reduction. This guidance is intended to assist them in the development and implementation of wildlife strike risk control measures. In addition, this document provides guidance on how the risk of a wildlife strike at, or in the vicinity of, an aerodrome may be assessed and what risk reduction measures may reasonably be taken to comply with required standards.

The aerodrome operator may, however, choose to deviate from these methods but, if doing so, will need to demonstrate that an equivalent level of safety can be achieved and provide evidence that the alternative methods are as effective as the "good practice" outlined in this document.

CAA requires that all involved parties are familiar with the contents and procedures described herein

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CHAPTER 1 – Introduction

1.1 Pursuant to Article 3 of the Law No. 03/L-051 on Civil Aviation ("Official Gazette of the Republic of Kosovo" Year III/ No. 28, of 4 June 2008) and ADR.AR.A.015 of the Regulation No. 17/2017 on requirements and administrative procedures related to aerodromes ("Regulation No. 17/2017 on aerodromes"), the Republic of Kosovo has adopted the acceptable means of compliance (AMC) and guidance materials (GM) to illustrate means to establish compliance with Regulation No 03/2009, as amended, ("Basic Regulation") and its Implementing Rules. Regulation No. 17/2017 on aerodromes includes requirements, AMC's and GM's that address the wildlife strike hazard and risk due to the presence or development of wildlife attractant features on, or in the vicinity of, an aerodrome.

1.2 The Article 10 of Regulation No. 17/2017 on aerodromes, with the heading "Wildlife hazard management ", states that the wildlife strike hazard shall be assessed through:

1. the establishment of a national procedure for recording and reporting wildlife strikes to aircraft;

2. the collection of information from aircraft operators, airport personnel, etc. on the presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations; and

3. an ongoing evaluation of the wildlife hazard by competent personnel.

1.3 The article ADR.OPS.B.020 "Wildlife strike hazard reduction" of Regulation No. 17/2017 on aerodromes also states that the aerodrome operator shall:

1. assess the wildlife hazard on, and in the surrounding, of the aerodrome;

2. establish means and procedures to minimise the risk of collisions between wildlife and aircraft, at the aerodrome; and

3. notify the appropriate authority if a wildlife assessment indicates conditions in the surroundings of the aerodrome are conducive to a wildlife hazard problem.

1.4 For the purposes of this publication, CAA interprets "bird and birdstrike" to include all hazardous wildlife and wildlife strike references. The term "in the vicinity" is generally accepted to mean land or water within 13 km of the Aerodrome Reference Point (ARP) and "garbage disposal dumps" refers to landfill sites (i.e. the disposal of putrescible waste by landfill. Putrescible waste is solid waste that contains organic

matter capable of being decomposed by microorganisms and of such a character and proportion as to cause obnoxious odours and to be capable of attracting or providing food for birds or animals). An "appropriate aeronautical study" is taken to be a study that focuses on the potential flight safety implications at the relevant aerodrome(s) that an existing or proposed wildlife attractant development may cause. Such a study should consist of the overall assessment of the ambient wildlife strike risk at the aerodrome and a site-specific risk assessment relating to any development or site in the vicinity. An "appropriate authority" is considered to be an authority that has the power to take action in a particular situation. A further explanation of risk assessment factors is detailed in Chapter 3.

1.5 In the Republic of Kosovo, the Aerodrome operator should take all reasonable steps to ensure that the aerodrome's operating procedures make satisfactory provision for the safety of aircraft. The operator therefore should:

1. participate in the national wildlife strike hazard reduction programme;

2. establish procedures to record and report to the appropriate authority wildlife strikes to aircraft occurred at the aerodrome, in close cooperation with organisations operating, or providing services at the aerodrome;

3. ensure that wildlife hazard assessments are made by competent personnel; and

4. establish, implement and maintain a wildlife risk management programme.

1.6 To meet the requirements as set in article 1.2 and 1.5, a Wildlife Risk Management Program (WRMP) should be developed in order to:

1. assess the potential wildlife strike risk;

2. reduce wildlife and wildlife invasions on the aerodrome, as far as is reasonably practicable;

3. in liaison and co-ordination with local planning authorities, implement an aerodrome safeguarding system to identify, and, where possible, address existing and planned developments within 13 km of the aerodrome that may have the potential to increase the wildlife strike risk;

4. record, monitor, assess and analyse wildlife strike reports; and

5. make great efforts to improve the effectiveness of the WRMP through ongoing evaluation by competent, trained personnel.

1.7 Wildlife strike risk management should be an integral part of the aerodrome operator's safety management culture and its safety management system (SMS).

1.8 The reporting of wildlife strikes in the Republic of Kosovo is mandated by Regulation No. 09/2017 on Reporting, Analysis and Follow-Up of Occurrences in Civil Aviation and is described further in Chapter 6.

1.9 When addressing the hazard posed by bird and wildlife, stakeholders must ensure their actions are lawful.

1.10 All aerodrome operators should ensure that personnel engaged in aerodrome wildlife control and dispersal activities are aware and familiar with the legislation to ensure that all wildlife control activities (both on-aerodrome and in the vicinity) are conducted within the law.

1.11 The aerodrome operator also needs to consider the impacts of aerodrome bird control and related activities on sites that have been designated for protecting wildlife.

1.12 Airports operating adjacent to or in close proximity to designated nature conservation sites should discuss their WRMP with relevant authority to ensure that any activities carried out meet the requirements of the relevant environmental legislation. However, air safety must not be compromised.

1.13 Some aerodromes may not be located immediately adjacent to designated sites but may have designated sites within their 13 km bird "safeguarding" area. Aerodrome operator should make contact with the CAA, as appropriate, to confirm the locations of these sites and discuss the implications of any wider wildlife management activities that may impact on any species designated at these sites.

CHAPTER 2 - The Management of the Wildlife Strike Risk

Principles and Objectives

2.1 The reduction of wildlife strike risk involves the application of specialist knowledge to identify hazards, evaluate management options and develop strategies to reduce risk. All reasonable measures should be aimed at deterring birds from flying within the same airspace as aircraft either on, or in the vicinity of the aerodrome. Primary control options involve the use of aerodrome habitat management, active wildlife control procedures and safeguarding. The wildlife strike risk is not, however, uniform across all types of aerodromes and flight operations, hence it is essential that the most appropriate measures are identified and adopted to suit local conditions. Effective use of risk assessment, wildlife habitat management, wildlife control and safeguarding can reduce the presence of wildlife on aerodromes and the risk of a wildlife strike.

2.2 The basis of all wildlife strike risk management policy and action is the planning of appropriate controls[1] and procedures, which reflect the principles of safety management that an aerodrome operator is required to apply to all aspects of operations within its responsibility.

2.3 The objective of wildlife strike risk management is to implement a wildlife strike management policy and action those measures necessary to reduce the wildlife strike risk to the lowest practicable level.

Wildlife Risk Management Program

2.4 The article ADR.OPS.B.020 "Wildlife strike hazard reduction" of Regulation No. 17/2017 on aerodromes states that the aerodrome operator shall:

1. assess the wildlife hazard on, and in the surrounding, of the aerodrome;

2. establish a means and procedures to minimise the risk of collisions between wildlife and aircraft;

3. notify the appropriate authority if a wildlife assessment indicates conditions in the surroundings of the aerodrome are conducive to a wildlife hazard problem.

2.5 Pursuant Regulation No. 17/2017 on aerodromes, with the reference to the AMC1 ADR.OPS.B.020, the CAA requires an aerodrome operator to establish, implement and maintain a Wildlife Risk Management Program (WRMP) to comply

[1] Modification of habitats, prevention of attractants and application of techniques for dispersal and removal of wildlife

with the requirements in assessing their wildlife strike risk, and to define appropriate wildlife control measures enabling risk reduction strategies. The program should record the results of wildlife strike risk assessments that are conducted and specify the wildlife strike risk reduction measures currently employed. The measures should relate to the threat posed by each risk and, due to the relative unpredictability of wildlife activities, should be responsive to change as the risk varies. Such measures may include the wildlife control techniques detailed in this and other authoritative documents.

2.6 The priority should always be to minimize the risk to aviation safety by minimising the presence of large, flocking birds and waterfowl on and in the vicinity of the aerodrome and where practicable to manage and control other congregations (flocks) of birds colonising habitats that present a significant hazard to aircraft safety.

2.7 The wildlife risk management programme may cover an area of approximately 13 km (7 NM) from the aerodrome reference point, and should include, at least, the following elements:

(a) assignment of personnel:

1. a person who is accountable for developing and implementing the wildlife risk programme;

2. a person who oversees the daily wildlife control activities, and analyses the collected data and carries out risk assessments in order to develop and implement the wildlife risk management programme; and

3. trained and qualified staff who detect and record the birds/wildlife, and assess the bird/wildlife hazard, and expel hazardous birds/wildlife;

(b) a process to report, collect, and record data of struck and living birds/wildlife;

(c) a process to analyse the data and to assess the bird/wildlife hazard to develop mitigation, proactive, and reactive measures. This should include a risk assessment methodology;

(d) a process of habitat and land management both on, and in its surroundings, whenever possible, in order to reduce the attractiveness of the area to birds/wildlife;

(e) a process to remove hazardous birds/wildlife;

(f) a process for liaison with non-aerodrome agencies and local landowners, etc. to ensure the aerodrome is aware of developments that may contribute to creating

additional bird hazards within the surrounding of the aerodrome's infrastructure, vegetation, land use and activities (for example crop harvesting, seed planting, ploughing, establishment of land or water features, hunting, etc. that might attract birds/wildlife).

2.8 Analysis of wildlife strikes should be undertaken at least annually and ideally when each event occurs, as part of the risk assessment process detailed in Chapter 3. Data recorded in a "bird log" or equivalent data capture system (electronic or manual) is essential intelligence to provide evidence that active bird control is in place in the event that an incident occurs, and equally provides an opportunity to assess and evaluate variations in wildlife occurrences in different areas of the airfield.

Implementation of Bird Safeguarding Systems

2.9 This should include detailed activities employed by the aerodrome operator to control or influence areas beyond the boundary of the airfield, in the vicinity of the aerodrome (up to 13 km and in some instances beyond) in order to minimise the attraction to wildlife, and include the:

1. establishment of a safeguarding process with the local planning authority for consultation on proposed developments that have the potential to be wildlife attractant within 13 km of the aerodrome;

2. means to influence land use and development surrounding the aerodrome so that the wildlife strike risk does not increase and, wherever possible, is reduced;

3. means to help encourage landowners to adopt wildlife control measures and support landowners' efforts to reduce wildlife strike risks, via land use agreements and;

4. procedures to conduct, and record the results of site monitoring visits.

Review and Evaluation

2.10 The WRMP should include the procedures in place to monitor and evaluate the effectiveness of control strategies at reducing risk, these should include:

1. wildlife control performance monitoring, measurement and improvement systems;
2. personnel training, competence assessment and appraisal.

2.11 The WRMP should be referred to the Aerodrome Services and Operations Manual and made available for audit by the CAA.

CHAPTER 3 - Roles and Responsibilities

Introduction

3.1 The roles and responsibilities of all personnel, including those applicable to wildlife hazard control, are important elements of the aerodrome operator's safety management system and contribute to the effectiveness of the WRMP. All personnel should have a thorough understanding of their roles and responsibilities within the program and be able to collaborate actively with other organisations on and off the aerodrome, such as air traffic control and local landowners. The roles and responsibilities of personnel associated with wildlife control duties undertaken on a typical aerodrome are described in this Chapter. The roles and responsibilities may be adjusted to suit an aerodrome's specific wildlife control circumstances.

Bird Control Manager/Coordinator

3.2 Although the aerodrome operator has overall accountability for wildlife hazard management at the aerodrome, responsibility for wildlife control and the delivery and implementation of the WRMP at the aerodrome is typically delegated to a co-ordinator: this is usually the Aerodrome Operations manager or Rescue and Fire Fighting manager although aspects of these can be delegated to an external third party organisation. Regardless, the aerodrome operator should ensure that there are auditable mechanisms in place, which may be part of a service level agreement, to ensure that only trained, assessed and competent persons are employed to deliver these services to the aerodrome. The core essential requirements are to:

1. understand how to assess the wildlife strike risk level;
2. produce the WRMP and determine risk management policies;
3. provide resources for the implementation of WRMP;
4. ensure and oversee implementation of the WRMP;
5. ensure that the WRMP reference or cross-reference to the Aerodrome Services and Operations Manual is correct;
6. audit the effectiveness of the WRMP;
7. produce statistical analysis of strike records;
8. maintain the appropriate related policies and procedures; and
9. demonstrate evidence that information concerning the wildlife hazard is communicated within the aerodrome senior management and to stakeholders at airside or flight safety committees.

3.3 The Wildlife Coordinator should ensure the following tasks are effectively fulfilled by:

1. monitoring habitat changes on and in the vicinity of the aerodrome, and the

development and implementation of appropriate management and control activities;

2. ensuring implementation of habitat management, or long grass policy (LGP) maintenance programmes in accordance with the WRMP.

3. introducing modifications to the grass maintenance regime as necessary and an understanding of the implications to the bird hazard when not managed effectively or deviating from LGP best-practice;

4. analysis and interpretation of log records of wildlife control activities, wildlife strike reports on and off-airfield wildlife count data;

5. regular surveys of wildlife concentrations and movements of wildlife in the local area (up to or beyond 13 km as determined by local management policies) ;

6. liaison with local landowners on mitigation actions;

7. monitoring of the effectiveness of any bird and habitat management measures in place;

8. identification of potential wildlife strike risks through collection of local ornithological reports and survey data;

9. seeking of advice and assistance from outside specialists on matters requiring expertise not available at the aerodrome; and

10. production and promulgation of reports on WRMP specific wildlife strike topics, safety briefs and wildlife strike risk warnings as required.

3.4 Bird/wildlife control operations on the airfield itself often require additional co-ordination to ensure that they are effective and meet the WRMP. Such tasks should include:

1. planning and organising wildlife control operations in accordance with the WRMP;

2. supervising, monitoring and auditing direct wildlife control operations to ensure that the WRMP is implemented correctly;

3. ensuring wildlife control record-keeping (recording observation counts, strike recording and reporting, dispersal, culling (reducing the population of a wild animal by selective slaughter) and habitat management logs, etc.) are correctly recorded in a manner that can be easily interrogated and

audited;

4. provision of technical supervision of wildlife control operators, intelligence gathering, and planning;

5. facilitation of active surveillance on and around the aerodrome, wildlife dispersal, culling and other field tasks;

6. ensuring that all necessary training, passes, permits and certificates are current;

7. ensuring the supply and safe keeping of equipment and consumables;

8. providing a communications channel between the aerodrome policy makers/providers, wildlife control operators and other interested parties, such as airline operators and air traffic control;

9. issue of NOTAM/ATIS system warnings as required to notify stakeholders of specific bird hazard related information.

Aerodrome Wildlife Control Personnel

3.5 Wildlife control personnel are those responsible for the direct delivery of wildlife control duties on the aerodrome and have the responsibility to enact the WRMP to counter any wildlife presence on the airfield that presents a potential risk to aircraft flight operations. As such, the wildlife control personnel's duties should include as a minimum:

1. maintaining surveillance of wildlife activity on the aerodrome and where practicable, beyond the aerodrome boundary;

2. implementing active wildlife control measures in accordance with the WRMP to counter any detected wildlife strike risk;

3. providing information to air traffic control with details of potential wildlife strike risks and management activities as they occur;

4. recording and reporting all confirmed, unconfirmed and near-miss or suspected wildlife strikes, including suspected "vortex" strikes;

5. advising the accountable officer of habitat control issues on the airfield and identifying improvements to the wildlife control process; and

6. assisting with wildlife/bird surveys and gathering of intelligence on and in

the vicinity of the aerodrome, the records of which should be logged in accordance with paragraph 3.6 below.

Record-keeping

3.6 It is essential that wildlife hazard management procedures, as set out in the WRMP, provide for accurate and complete recording of all bird control activities undertaken both tactically and strategically and on a daily basis. Records, and the data collected from them, provide for a variety of functions to be fulfilled including an ability to evaluate the success of risk management programmes, identification of areas requiring attention, highlighting of key risk periods and provision of a record that confirms the activities that were being undertaken in the event of an incident. The following records should be kept and logged, preferably electronically, whenever wildlife control activities are being undertaken:

1. The Wildlife Officer (WO) on duty;
2. Start time of WO;
3. Finish time of WO;
4. Time of each activity or record;
5. Location of activity;
6. Species;
7. Numbers of each species seen, including nil returns;
8. Dispersal action taken;
9. Reaction of wildlife to dispersal;
10. Direction of dispersal;
11. Any other comments.

3.7 Wildlife control records allow the airport to confirm it has been fulfilling its safety obligation to deliver a safe operating environment for aircraft. They can also be analysed to help evaluate evidence of any wildlife control issues. This can include an assessment of habitat in relation to wildlife presence recorded and identify where management action is required. It may highlight when and where particular species are routinely being recorded and help confirm or identify issues that are arising. The log can therefore be used to help enable deployment of resources to better facilitate

risk reduction.

3.8 The recording and analysis of the wildlife control log should be used together with an analysis of wildlife strike records either as they occur, on a monthly basis, or for smaller, less busy aerodromes with few strikes, at least annually. The conclusions of the analysis should be shared with relevant managers and used to inform the aerodrome WRMP and risk assessment as part of annual review

CHAPTER 4 – Risk Identification

Introduction

4.1 This Chapter describes the factors that should be considered in an assessment of the wildlife strike risk at an aerodrome.

Assessment of the Wildlife Strike Risk

4.2 The aerodrome operator should be able to demonstrate that they have considered the risks associated with wildlife strike management and that they have a suitable program in place to reduce and manage those risks. The aerodrome operator should therefore develop and maintain a systematic method of obtaining information regarding wildlife strike hazardous species and habitats on, and in the vicinity of, the aerodrome on a regular basis. This should include:

1. assessing the hazards posed by wildlife in the context of aircraft operations;

2. analysis of wildlife strike records to identify how many of each species have been struck;

3. identification of wildlife more likely to cause damage to aircraft, such as flocking birds and larger heavier species; and

4. development of a risk assessment methodology to inform the wildlife control programme.

4.3 The background level of wildlife presence that would occur in the absence of any control measures should be determined. This information provides a baseline measure against which to assess the effectiveness of any future wildlife risk management program. Details of existing wildlife locations and wildlife movements both on and off the aerodrome should be established in order to provide an accurate database and allow resources to be targeted effectively. A risk assessment should then be conducted to provide a measurable benchmark that can be used to evaluate the effectiveness of control measures on a repeatable basis. This should include information such that:

1. each wildlife strike species can be assessed in detail;

2. each risk can be measured in the short and long term, dependent upon wildlife population and seasonal changes;

3. the potential risks can be assessed on a comparable basis;

4. the continuing risk can be monitored; and

5. control actions can be focused in a structured manner.

4.4 A typical risk assessment process should therefore involve:

1. a detailed hazard description, identifying wildlife species and associated habitats that influence the size and behaviour of wildlife populations in the area;

2. an assessment of the probability of a wildlife strike with each particular species, taking into consideration the current mitigation procedures in place and seasonal factors;

3. consideration of the species involved, including size and numbers (e.g. solitary or in flocks) and an assessment of the likely (aircraft damage) severity of the outcome of a wildlife strike;

4. an assessment of the frequency of serious multiple wildlife strikes[2];

5. the determination of the acceptability of the level of risk by summing the probability (Figure 1) and severity (Figure 2), based on a probability/severity matrix, such as that illustrated in Figure 3 (where the colours red, yellow and green depict intolerable, tolerable and acceptable risks);

6. the identification of management options for tolerable and intolerable risks; and

7. the development, implementation and monitoring of an action plan to eliminate, reduce or mitigate intolerable risks.

Likelihood	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

Figure 1 Safety risk probability table

[2] Where more than 2 birds are struck and more than 10 birds are seen, or when more than 10 birds are struck.

Severity	Meaning	Value
Catastrophic	– Equipment destroyed – Multiple deaths	A
Hazardous	– A large reduction in safety margins, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely – Serious injury – Major equipment damage	B
Major	– A significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of an increase in workload or as a result of conditions impairing their efficiency – Serious incident – Injury to persons	C
Minor	– Nuisance – Operating limitations – Use of emergency procedures – Minor incident	D
Negligible	– Few consequences	E

Figure 2 Safety risk severity table

Risk probability	Risk severity				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent 5	**5A**	**5B**	**5C**	**5D**	**5E**
Occasional 4	**4A**	**4B**	**4C**	**4D**	**4E**
Remote 3	**3A**	**3B**	**3C**	**3D**	**3E**
Improbable 2	**2A**	**2B**	**2C**	**2D**	**2E**
Extremely Improbable 1	**1A**	**1B**	**1C**	**1D**	**1E**

Figure 3 Safety risk assessment matrix

4.5 Aerodrome operators should be able to develop a comprehensive and sustainable WRMP from the risk assessment process above. However, further review of bird movements and changes in populations, including the effect of mitigation action, and the environment is necessary to re-assess the residual (remaining) risk once the WRMP is in place.

All risk assessments should be reviewed regularly to ensure validity. Birdstrike reports are one useful tool in assessing whether the risk is changing or increasing. All stakeholders at an aerodrome should be encouraged to share data on the birdstrikes occurring on the aerodrome, in the vicinity of the aerodrome or en-route. Analysis of this information will allow the aerodrome operator to establish a more accurate assessment of the current risk, which will allow risk reduction methods to be targeted more effectively.

Intelligence Gathering

4.6 Intelligence gathering is an essential component of the wildlife strike risk assessment process and should include the monitoring of all potential wildlife attractants, concentrations and movement patterns of risk species both on, and importantly, in the vicinity of the aerodrome. Additional to observations by aerodrome personnel, liaison with local landowners and land users such as local bird watchers and ornithological societies, nature reserve wardens, farmers and pigeon racers may give useful information.

4.7 Aerodrome wildlife control personnel should be encouraged to be aware of wildlife activity around the aerodrome and to pass information on to the appropriate personnel.

4.8 Awareness and understanding of wildlife concentrations and movements can improve the efficiency and effectiveness of wildlife control on the aerodrome. When assessing attractants, a clear understanding is needed of the direct impact each wildlife site and its proximity to the aerodrome is likely to have on the potential wildlife strike risk, having identified and taken into account the wildlife species involved.

Off-airfield Wildlife Surveys ("13 km bird circle")

4.9 Off-airfield wildlife surveys should be conducted to enable the identification of bird and other wildlife attractants, concentrations and regular movement patterns of hazardous wildlife at different times of the year. Each wildlife attractant habitat or development within the vicinity of an aerodrome should be assessed and monitored. Having identified the wildlife attractants within the vicinity of an aerodrome, the potential impact should be assessed so that the level of risk presented to flight operations can be determined. Such an assessment may include the following factors:

1. location - the proximity to the aerodrome and direction from the aerodrome;

2. the site attractiveness - whether it is used as a source of food, a roost site or a breeding site;

3. the species and numbers of birds/wildlife present;

4. flight lines of birds to/from the site - whether flight lines are direct to the aerodrome, cross aircraft flight paths outside the aerodrome boundary, or are overhead the aerodrome are all important factors that should be considered;

5. the relationship of a site to other sites that attract the same species e.g. the location of a landfill facility that attracts hunting gulls will need to be assessed in relation to local reservoirs or nesting sites that attract roosting or breeding gulls respectively;

6. daily/seasonal factors - whether the site is a continuous risk (each day and throughout the day), a regular daily risk (once/twice a day), a risk related to specific daily or seasonal activities, or an annual risk;

7. any control action undertaken by the site operator. Actions may range from no action to housekeeping actions only, passive and active wildlife deterrence measures, such as proofing and culling; and

8. perhaps most importantly, the schedule of periodic and seasonal visits to sites should be documented so that an accurate assessment of the different risks associated with a site at different times of day or year can be evaluated.

4.10 It is recognised that aerodrome operators may choose to monitor off-aerodrome bird activities in different ways, subject to the level of hazard presented, local risk assessment and resources. It is therefore recognised that the use of this guidance should be proportionate to risk and as such, aerodromes, as part of their SMS approach to hazard management and risk identification and assessment, may determine alternative means to achieve the desired benefits of off- aerodrome intelligence gathering and monitoring. It is important, that the aerodrome's WRMP reflects whatever process that has been used to determine the alternative approach and the rationale for deviation from this guidance.

4.11 Typical factors that should be considered and are applicable to on- and off-aerodrome habitats are detailed in the following paragraphs.

4.12 At smaller aerodromes, particularly those conducting flying training and general aviation only, it may be acceptable for the aerodrome, subject to the birdstrike risk and resources available, to determine the level of off- airfield wildlife surveys undertaken. Ultimately, it is for the aerodrome operator to determine and manage the effectiveness of bird safeguarding out to 13 km. Subject to local policies outlined within the WRMP, it is acceptable to reduce 13 km to a lesser radius, where this would provide greater effective oversight and intelligence on bird and wildlife activities affecting the aerodrome.

Wildlife Attractant Habitats: On-Aerodrome

4.13 Different wildlife species show different levels of adaptability but all require food, water, safety and somewhere to breed. Aerodrome environments provide a wide variety of attractants and therefore need to be identified and assessed to determine the most appropriate prevention, controls and reduction actions. The following may also apply to sites in the vicinity of the aerodrome.

Food

4.14 Food resources will vary by species but could include:

1. earthworms, snails, slugs, spiders, millipedes, insects and insect larvae present in grassland and the underlying soil;
2. weed species present in the grass;
3. weed species that are present within water bodies;
4. small mammals water bodies;
5. wastes from in-flight and terminal catering areas, litterbins in car parks or on aircraft viewing terraces, etc;
6. small birds within the environment of the aerodrome that have the potential to attract birds of prey;
7. scrub, bushes, brambles and trees.

4.15 Different food sources may result in different species being present on the aerodrome at different times of year. Starlings and rooks may gather in large flocks to feed on soil invertebrates on aerodromes at any time of year. Similarly voles may be accessible to birds of prey such as Kestrels and Buzzards throughout the year but when they proliferate (increase the presence) in late summer they result in key risks at those times. Management of food sources for wildlife on an airfield is the key to minimising the wildlife risk at the airfield.

4.16 Some birds will eat the seeds of flowering grasses if they are allowed to grow long (e.g. sparrows and some pigeon species). Unless a short grass policy or hay/silage policy is in place, grass itself is generally not a wildlife attractant. The habitat it creates, however, can have a large impact on wildlife presence and risk.

4.17 Activities in fields close to an airport like ploughing, harrowing and cropping which disturb the soil, together with sludge spraying, manure (fertiliser) spreading, seed drilling, ripe crops, harvesting, and hay and silage cutting, create feeding opportunities for gulls, lapwings, corvids, starling and pigeons that may then attempt to visit the airfield. Such activities inevitably attract birds and will increase the resources required for on-aerodrome wildlife control. Any such activity on an airfield

will significantly increase the wildlife strike risk. After feeding, wildlife such as gulls and lapwings may then remain in the vicinity for many hours.

Open Terrain

4.18 Flat, open terrain including airfield grassland, runways, taxiways, aprons and paved surfaces create secure areas for wildlife, as do buildings, lighting structures and other installations such as radar towers. Maintaining the grass at an appropriate height can eliminate the open aspect on the grassed areas and is one of the most effective measures of wildlife control.

4.19 The presence of other, less prominent features such as open drainage ditches, ponds, scrub, bushes and trees, earth banks, and waste food also provide further resources for wildlife to exploit.

4.20 Car parks may also provide out-of-season undisturbed refuges for wildlife as well as providing scavenging (hunting) opportunities during busy peak seasons.

Landscaping

4.21 Landscaping developments include grass reinstatement, tree and shrub planting and may involve the creation or enhancement of water features. Landscaping schemes also have the potential to:

1. create dense vegetation that may become a roost;

2. provide an abundant autumn and winter food supply in the form of fruits and berries;

3. create standing water or watercourses that attract gulls and waterfowl; and,

4. result in areas of short grass that provide feeding opportunities for a wide range of hazardous wildlife.

4.22 Landscaping schemes can have a significant impact on the on-aerodrome wildlife attraction. Attractions on the aerodrome should, where possible, be avoided as this may set a precedent for safeguarding and off-airfield developments.

4.23 Tree species provide food in the form of fruits flowers) and leaves as well as nesting and roosting opportunities for wildlife. Where possible, trees should not be allowed to exist within airside areas or within the airport boundary. Where trees do exist that cannot be removed, tree species should be selected that offer minimal resources and should be planted in such a way to reduce their attraction to birds.

4.24 Rooks and jackdaws have been known to nest on aerodrome lighting gantries and therefore access should enable nest removal if necessary. Landscaping that provides dense vegetation can provide nesting sites for woodpigeons, small passerine (perching birds) and magpies, as well as roosting sites for potentially large flocks of starling. These can form large communal roosts in dense vegetation that may be used where there is artificial shelter from hangars or other large buildings.

4.25 Aircraft hangars, terminal buildings, RFFS buildings (hangars), old aircraft, lighting and signage structures all provide roosting sites, perching opportunities or possible nest sites. Sheltered ledges, access holes and cracks within and underneath such structures can prove ideal for nesting locations for pigeons, Stock doves, Pied wagtails and starling. Rooftops themselves may be attractive to gulls or wading birds for nesting, loafing and roosting.

Water

4.26 Open, standing water, such as balancing ponds, and watercourses such as drainage ditches or river channels, may attract large flocking birds and waterfowl including ducks, geese, swans, grebes, waders, herons, coot, moorhen and cormorant. The more open water sites there are on and around an aerodrome, the more complex and frequent will be the movements of waterfowl on and around an aerodrome. There may also be more activity at night than during the day.

4.27 Wet weather can create water-logging and flush soil invertebrates (animal species that do not possess or develop a vertebral column, derived from the notochord; e.g. insects, worms, snails, etc.) to the surface making them very accessible to hunting wildlife.

4.28 In summary, airfields themselves therefore provide an abundance of wildlife attractive features that require proactive management activity to prevent creating a wildlife strike risk.

Wildlife Attractant Habitats: Off-Aerodrome

4.29 Both man-made and natural landscaping features off-aerodrome may also attract wildlife onto an aerodrome. These can include landfill sites, sewage works, building developments, drainage schemes, reservoirs and gravel pits, along with coastal areas, rivers and bays, woodland and agricultural land. Wildlife, particularly birds, can travel long distances relatively quickly; gulls in winter may, for example, commute over 50 km from a roost site to a feeding site. An environment that does not meet all their requirements can therefore be exchanged for one that does. At feeding sites that are widely distributed and numerous (e.g. ploughed fields in autumn), daily

dispersion may be diffuse or unpredictable, with the overnight roost the only constant feature. Flying from one site to another may establish flightlines of birds, for example, that cross an aerodrome or low level aircraft arrival or departure routes.

4.30 A food supply that is concentrated and abundant at only a few sites (e.g. landfill sites) causes fixed dispersal patterns and more predictable dawn and dusk flight lines. Overnight roosts for wildlife such as gulls, corvids and starlings tend to be very stable and fulfil a social function as well as providing shelter and security.

4.31 Species that depend on abundant food supplies tend to roost in larger groups and it is thought that the roost assembly provides a mechanism for the transmission of information on the location of food. Awareness and understanding of wildlife concentrations and movements can improve the efficiency of wildlife control on the aerodrome. For example, if the dusk return passage of gulls over the aerodrome to a roost is understood, aerodrome wildlife control personnel may be able to warn air traffic control at the appropriate time. Similar precautions may be taken for dawn and dusk movements of starlings, or it may also be possible to locate the roost site and disperse the wildlife to another roosting site. Also, the spring build-up at a local rookery can be predicted and plans made for action to deny breeding success.

Landfills for Food Wastes

4.32 Waste from household and commercial premises can contain a high proportion of putrescible (food) waste which, when disposed of at an open landfill site, may support very large numbers of gulls, corvids and starlings.

4.33 Gulls congregating at landfills could contribute to the wildlife strike risk to nearby aerodromes in several ways:

1. When not feeding, they spend most of the day on open sites within 6 km of the landfill;
2. They may fly up to 900 m (c.3000 ft) or more in clear weather; and
3. They may commute between the landfill and their roost, which may involve crossing an aerodrome or its approach and departure routes.

4.34 Corvids and starlings may also exhibit similar behaviour although the distances they travel are generally less than that recorded for gulls (max 16 km to or from a roost site).

Sewage Treatment and Disposal

Sewage treatment plants can attract large numbers of common gulls and starlings. Numbers may vary depending on the type of installation being operated and the

effluent release system employed.

Reservoirs, Lakes and Ponds

4.35 Water bodies ranging from small ponds to large man-made reservoirs can attract wildlife species for food (weed, vertebrate and invertebrate species), roosting (space and security) and nesting sites (often islands or spits). Waterfowl, wading birds, fish eating birds and gulls may congregate in large numbers at such locations.

Sand, Gravel and Clay Pits

4.36 The large voids created by mineral workings sometimes result in ponding during extraction. This can lead to temporary habitats that are suitable for a range of waterfowl. Similarly, restoration by flooding to provide amenity lakes or nature reserves may provide critical habitat around an aerodrome.

Agricultural Attractants

4.37 Growing and harvesting crops certainly attracts wildlife at some stage. However, the attraction usually arises suddenly and persists for only a few days or weeks. The contribution of agricultural activities to the wildlife strike risk is mainly confined (limited) to local farms.

4.38 Livestock can also attract wildlife. Collared doves, feral pigeons, starlings and house sparrows can occur in large numbers wherever grain or cattle feed is accessible, either as spillage or in store. Farm buildings may be suitable for nesting species such as feral pigeons. Proximity of agricultural attractants may create high levels of birdstrike risk to the aerodrome.

CHAPTER 5 - Risk Reduction

Introduction

5.1 This chapter describes typical wildlife strike risk reduction and wildlife control measures that may be employed to reduce the hazards associated with the wildlife strike risk identified in Chapters 3 and 4.

Habitat Management

5.2 Effective habitat management is the most important activity available that reduces the numbers of hazardous wildlife present on an aerodrome. Techniques should be aimed at the removal or reduction of habitats that attract wildlife that give rise to the greatest risk. The key objective of habitat management is to proactively and systematically prevent hazardous wildlife from being attracted to the airfield environment in the first place and thereby reduce the reliance on reactive and active bird control methods in order to prevent wildlife strikes. Where attractions are identified and habitat modification, elimination or proofing is not possible, combinations of active control will be required to minimise the remaining residual risk. Habitat control should be given priority and active control only relied upon to reduce risk where features of the environment can be shown not to be providing an attraction.

5.3 Aerodrome grass has the potential to provide food, security and possible nesting sites for a variety of wildlife. Short grass acts as an attractant to most aerodrome wildlife and should be avoided. Similarly, wild flower fields and grassland managed for silage or hay crops can attract large numbers of wildlife at different times of year and should be avoided. Silage cutting results in a higher percentage of weed seeds and increased deterioration of the area covered with short grass. Longer grass (typically above 300 mm) that falls over because it cannot support itself also has a greater potential to attract wildlife. Grass that is maintained at a height of 150 to 200 mm with minimum levels of weed infestation has been proven to reduce the presence of wading birds (e.g. lapwings), passerines (e.g. corvids and starlings), gulls, and pigeons. This method of grass management is often referred to as a "long grass policy" (LGP).

5.4 The long grass policy will also help to reduce the attractiveness of the airside sward (short grass area) to rabbits, as long (damp/wet) grass affects the ability of rabbits to effectively thermo-regulate their body temperature and therefore longer grasses are less pleasant, when compared to a short grass sward.

5.5 All grass areas within the aerodrome boundary, including the margins adjacent to runways and taxiways should be included within a grass maintenance scheme. As

grass grows according to season, so does the presence of certain wildlife species and therefore grass maintenance should be planned accordingly to deter target species when necessary. The LGP is therefore intended to deter the most common hazardous birds found on an aerodrome.

5.6 The intention of the LGP is to produce a healthy, erect, dense sward, which is free from broad-leaved weeds. This acts to keep away wildlife that wish to reside on the airfield, reduce security and reduce the accessibility of food that wildlife may wish to feed on. Grass on aerodromes should therefore be maintained at a height of 150 mm – 200 mm and be capable of standing upright in the winter months. It is recommended that the aerodrome operator consider obtaining expert advice when deciding upon the appropriate maintenance scheme for aerodrome grass. The aerodrome operator should employ the LGP management scheme most appropriate to the aerodrome and based on the birds posing a hazard on the aerodrome.

5.7 Insect larvae within the soil structure can have a major impact on wildlife attraction. Whilst species should always be identified to ascertain management programmes first, the two main pest species that require monitoring are the crane fly larvae, commonly called leatherjackets, and the chafer beetle larvae. Both of these have a direct effect on the turf by eating the plant roots and act as direct cause of wildlife population increase by providing a high protein food source – particularly for corvid species. The activities of the larvae and associated foraging by wildlife can severely disrupt the grass surface and in extreme cases they may strip an airfield of grass giving rise to a potential Foreign Object Debris (FOD) risk.

5.8 Monitoring of adult insects, alongside accurate determinations of insect larvae populations within the soil profile, should be undertaken. Results can act as a trigger for the application of insecticides.

5.9 The grass species should be monitored annually to ensure that over 50% of the ideal upright species ("Tall Fescue") is present in sufficient density to maintain the effectiveness of the short grass. Where this is not the case consideration should be given to over-seeding to increase the desired grass species and reduce weed grasses.

5.10 If the weeds exceed 5% of the total area, selective herbicide spraying should be undertaken. Broadleaved weeds provide a direct food source for wildlife (e.g. woodpigeons) and enhance the attraction of an airfield by producing seeds and insects that feed on the flowers that arise. Application times and the choice of herbicide will vary dependent on the weed species present.

5.11 Grass trimmings (arisings) that settle down between the stems after each cut results in "thatch", a matted layer of dead stalks, moss, and other material in a lawn. This can prevent applications of fertiliser, insecticide or herbicide from acting effectively, can reduce growth levels in the grass and provide a suitable micro-habitat for insects and small mammals that in turn attract wildlife. At no time should the

thatch be allowed to measure more than 25 mm from the top of the soil profile. Greater heights than this means deterioration of the sward caused by the weakening of the desirable grass species. Thatch should be removed during the bottoming-out process that is required to maintain a healthy sward under a long grass policy.

5.12 Rooting depth of the sward should also be measured to ensure that grass plants are maintaining the correct root/shoot ratio required to provide optimal growth. A failure of the root system will necessitate a more detailed agronomic review to determine the causes and the suggested remedies.

5.13 The new species of grass available also reduce topping cut operations by up to 40% and can extend the requirement for bottoming-out operations to every four years due to lower clipping levels.

5.14 Long grass regimes should involve the appropriate responsible aerodrome wildlife control personnel in planning, monitoring and regulating the maintenance programme if it is to be effective at targeting wildlife repellence.

5.15 Long grass maintenance requires activity throughout the year. Aerodrome operator should take account of local climatic conditions for planning their own maintenance regime. Bottoming out is suggested for the spring but can be moved if specific circumstances arise on the aerodrome.

Example Long Grass Policy Maintenance Regime

5.16 Mid-March to late May is normally the period of minimum wildlife activity as hazardous species are generally involved in breeding. Prior to this, wintering flocks of small gulls or lapwings may be attracted to short grass areas. As soon as the ground will permit maintenance vehicles to access the grass without compacting and rutting the soil, dead growth and the accumulated clippings from past topping cuts should be removed. This operation is called “bottoming-out”. If left to build-up, decaying material (“thatch”) will exclude light and air, suppress growth and weaken or even kill the grass and encourage pests and disease. Delayed seeding of grass produces fewer woody stems to hold the subsequent leafy growth erect throughout the winter.

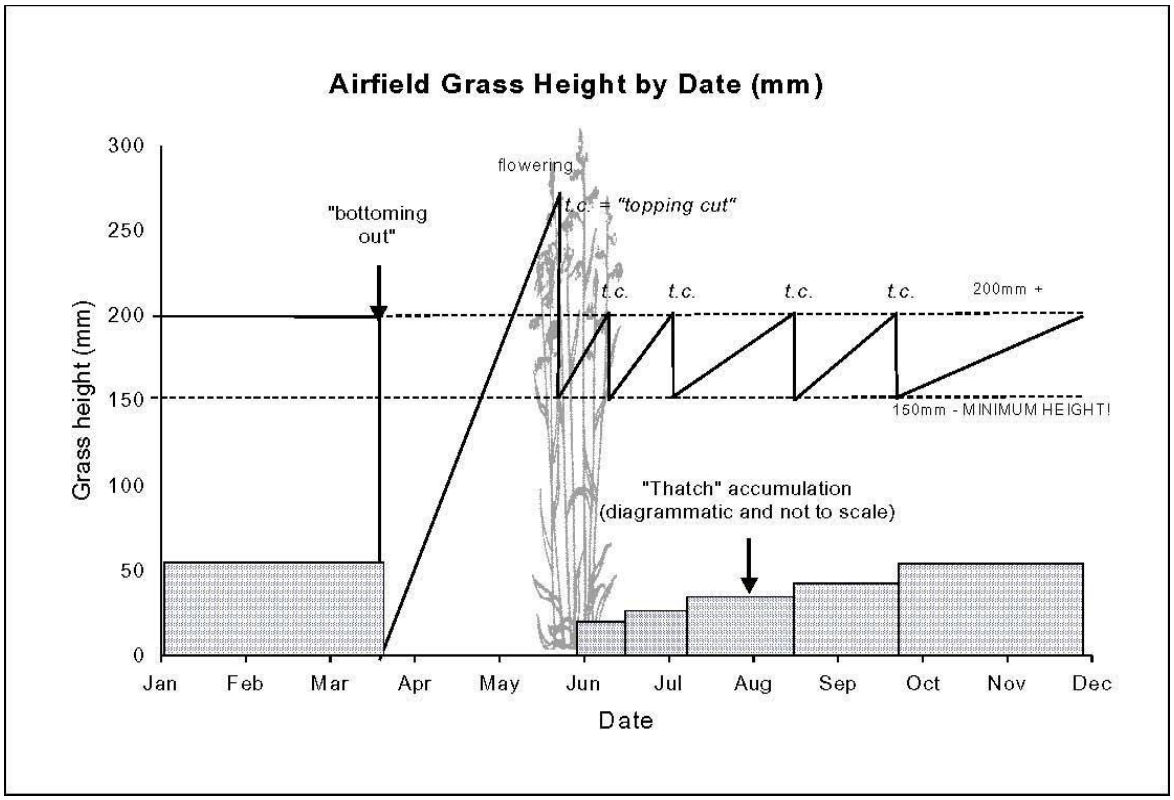


Figure 4 The Management of Traditional Long Grass Policy on an Airfield

5.17 Bottoming-out therefore involves two processes: cutting the grass uniformly low (ideally to within 25 mm of the ground) and removing the freshly cut grass together with the accumulated thatch from previous years. Typical equipment available for bottoming-out is a flail-type forage harvester and a forage harvester, which has rotating discs or drums with cutting blades, as well as self-collecting forage wagons. The equipment should be able to dislodge and collect the accumulated thatch for removal directly into an accompanying trailer, thus avoiding a separate operation to collect the loose material, which presents a potential FOD issue.

5.18 Aerodrome managers may consider delaying the bottoming-out operations where the ground is waterlogged or is in an unstable condition. Vehicle use could result in rutting of the surface and other potential soil structural damage. In extreme situations or where climatic conditions create temperatures below 6°C, recovery of the vegetation following bottoming-out is very slow and has the potential to delay the effectiveness of the long grass policy. In these situations consideration should be given to delaying the procedure until late summer.

5.19 In situations where weather inhibits the spring bottoming-out, the reduction of the grasses and vegetation to 25 mm by bottoming-out in late August creates new growth to a height of 150 mm within three to four weeks in normal weather conditions. In addition, the rapid re-growth reduces the invasion of weed grasses, which can be aggressive at this time of the year. The use of an autumn slow release fertiliser applied at a ratio of 40grms/m² with a ratio of 2-1-1 further encourages the growth of grass.

Bottoming-out in autumn, however, results in fewer seeding spikes and therefore a sward that has the potential to be less repellent during the winter months.

5.20 Where damage occurs through use of equipment on uneven ground it is recommended that new species of grasses are used to reinstate these areas as soon as the temperatures exceed 6°C.

5.21 Managers should be aware that failure to remove decaying vegetation (bottoming-out) when it reaches a depth of 25 mm will result in slower recovery of the sward and give rise to a potential increase in wildlife activity. The grass habitat will become weaker with increased weed infestations likely during the autumn and spring growing periods.

5.22 The ideal time for the correct grass growth is mid-May which should help target when normal bottoming-out operations are undertaken. To help encourage rapid establishment of grass and reduce the invasion of weed grass species, airfield operators should consider an application of nutrient (fertiliser). Compounded nutrient slow release organic granules with a ratio of 2-1-1 (Nitrogen Phosporus Potassium (NPK) create a more even spread and avoid a flush of growth that could damage grass stems that are needed to stand upright throughout the summer and winter periods.

5.23 Aerodrome managers should consider a phased replacement of the grass habitat during the bottoming-out process over a three to five year period with new upright species. This will ensure that grasses do not fall over in periods of inclement weather and provide a clear base area above the plants' rhizomes for arisings to decay and avoid the build-up of future thatch.

5.24 Incorporating new grasses into airfield management programmes using special over-seeding techniques, has reduced bottoming-out and grass-cutting operations by 40% while maintaining the wildlife habitat deterrent.

5.25 Depending on the local microclimate, soil types and grass species bottoming-out will normally be required every one to four years to ensure that the decaying vegetation is removed.

Alternative Grass Management Options

5.26 Deviation from the long grass policy is not recommended. It is, however, acknowledged that alternate grass management techniques are available (such as very long grass, poor grass, silage or hay cropping cycles). The use of any such programme should include evidence that they will not increase wildlife populations or risks to flight safety in any given environment before being acceptable.

Potential Effect of Grass Height on Navigational and Visual Aids

5.27 The height of the grass in certain areas on the aerodrome may affect the performance of aeronautical navigational and visual aids, especially the Instrument Landing System (ILS).

5.28 In damp or wet conditions the radiated signal as received by an aircraft or the signal received by the ILS field monitors may be distorted, affecting both the integrity and continuity of service of the system. The effect of grass on the ILS signal depends on the:

1. type of grass (broad or narrow leaf);

2. height of the grass and density of growth;

3. water content within, or water from dew (precipitation) or rain on, the leaves; and

4. height and type of aerials (transmitting and monitor).

5.29 It is not possible to give exact grass heights that would cover all systems and environments. However the following have been shown to be acceptable:

- ILS glidepath - grass height of up to 100 mm is considered to be acceptable from the glidepath aerial to approximately 5 m beyond the monitors. A grass height of up to 200 mm is considered to be acceptable beyond this point up to the limit of the glidepath critical area.
- ILS Localiser - a grass height of up to 200 mm may be considered acceptable within the critical area. Other heights may also be suitable; however, the advice from the Air Navigation Service Provider (ANSP) should be sought before implementation of any deviation from these grass heights.

5.30 The height the grass should not obstruct the display of any aeronautical ground light, sign, marking or other type of visual aid.

5.31 Aerodrome operators are advised to consult the relevant technical organisation on the issues above.

Other Vegetation Management

5.32 The objective of wildlife habitat management is to reduce the diversity of habitat on the aerodrome. Where possible, all hedges, trees, shrubs and bushes should be removed and the landscape turned to long grass policy. In landside locations, the attraction provided by screening vegetation or fruit- and berry-bearing plants may be

reduced by:

1. eliminating the most attractive species;

2. reducing the number, distribution and proportion of the plants;

3. thinning densely planted areas to reduce cover;

4. using non-evergreen varieties and species which do not produce berries or, for some, male plants only; and

5. keeping hedges trimmed to limit berry production or roosting opportunities.

5.33 The complete destruction of any plantation is the most effective and permanent means of preventing a roost from forming. However, the attractiveness of a potential roosting site may be reduced by lower planting density (i.e. maximising distance between shrub or tree centres), leaving open "rides" (open lines between trees and shrubs), and thinning out early to ensure the site remains open. Where this is not compatible with a screening function, staggered planting in separate rows should be used.

5.34 Where food waste could occur, all bins and skips provided should be of designs that exclude wildlife (e.g. with drop-down or swinging lids) and should be emptied before they overflow. Signage to ensure contractors and staff are all fully aware of the issues surrounding potential wildlife attractions should be erected where necessary. Waste food is a critical attractant to gulls, corvids, pigeon species and starlings and should not be tolerated on an aerodrome.

Buildings

5.35 Dilapidated or broken-down buildings should be proofed and repaired to prevent access by roosting or nesting birds. Proofing will need to ensure birds are unable to access a location. This could involve exclusion netting of the correct mesh size to prevent target species using the site, ledge spikes or other such prevention systems or active control methods. The requirement, however, will be to prevent any wildlife using these sites at any time and to be able to demonstrate this is being achieved.

5.36 Lighting and signage structures around an airfield may also provide roosting or perching opportunities for a variety of species. Where wildlife is observed using such locations, proofing should again be undertaken to prevent access where possible.

5.37 When new buildings are being designed they should:

1. prevent wildlife gaining access to the interior and roof spaces;

2. use self-closing doors or plastic strip curtains or other mechanisms to prevent access by wildlife;

3. be without flat roofs; and

4. have minimal roof overhangs and be without ledges beneath overhangs or external protrusions.

5.38 All rooftops should be easily accessible to enable action against nesting gulls or waders that commonly colonise large flat or shallow- pitched roofs. However, gulls will also use steeply sloping roofs where the nests can be lodged behind vents, skylights, and in gullies etc.

5.39 Specialist birdstrike advice should be sought before taking action against starling roosts, rookeries, breeding gulls and any wildlife inhabiting buildings to ensure the success of measures.

Water

5.40 Watercourses and drainage ditches provide cover, security and food, especially for ducks and herons. Wherever possible, watercourses on the aerodrome should be culverted. Where culverting is not possible, effective wildlife exclusion or control systems such as netting exclosures (an area from which unwanted animals are excluded) extending to the aerodrome perimeter should be deployed as necessary to protect new developments and existing water bodies and watercourses from wildlife. Channels should be maintained free of bank side and emergent vegetation to minimise the attraction to wildlife and damage to nets.

5.41 Netting exclosures are the most efficient approach and remove the need for any other control measures or habitat modification.

5.42 Drainage of wet and waterlogged grass should be undertaken or the site re-graded to eliminate hollows that hold standing water. Where drainage cannot be achieved, active control measures will need to be conducted to ensure that the site does not result in increased risk.

5.43 If large permanent water areas cannot be eliminated, wildlife should nevertheless be prevented from accessing sites. Where possible water bodies should be proofed using exclusion methods such as netted or specialist floating balls whenever present on an aerodrome. Wires suspended above the water surface could

be used over larger areas where netting structures may not hold up. These require careful spacing to ensure that target species are effectively excluded.

5.44 The following habitat controls can also reduce the attractiveness of water bodies to wildlife and are particularly applicable to developments off-site that are part of the safeguarding process:

1. The water should be as deep as possible (over 4 m) to minimise bottom-growing vegetation;
2. In order to reduce nesting opportunities, there should be no development of islands. Attached promontories or spits can be used to reduce the open expanse of waterbodies and prevent gull roosts forming.
3. Banks should be as steep as possible (preferably vertical), with vegetation only deployed to prevent wildlife from walking in and out of the water;
4. There should be a vertical fence approximately 1 m high placed around the water edge to prevent wildlife from walking in and out of the water;
5. Dense vegetation, which provides nesting cover, should be avoided. The water should be surrounded with long grass or a sterile substrate; and
6. Water should not be stocked with fish.

Landfills and Sewage Treatment and Disposal Sites

5.45 A netting exclosure is inherently the most effective and reliable system to control birds at a landfill site and at sewage treatment and disposal sites with open tanks. Many examples of installed nets, however, have poor maintenance regimes resulting in large rips or tears in the exclosures and a significant hazardous bird presence. Any agreed netting system should include an appropriate inspection and maintenance regime to ensure its reliability.

5.46 In many cases, effective active control programmes can be equally as effective at deterring gulls and corvids from landfill sites. Locations where netting provision or active control provision are required should be based on an appropriate aeronautical assessment to determine risk to the aerodrome.

Wildlife Control on an Aerodrome

5.47 Whilst aerodrome habitat management is critical for preventing wildlife strike risk from arising in the first place, effective control measures should then be deployed to manage the residual risks, respond to immediate issues and prevent hazards arising in the event that habitat management is not feasible. The following paragraphs identify the methods commonly used to control wildlife strike risks.

Deterrence

5.48 Wildlife responds to a variety of stimuli that can be used to disperse them away from an airfield. The objective of deterrence is not to scare wildlife randomly around an airfield but to control their movements and disperse them from the airfield in order to reduce risk. This can be achieved using a variety of methods for which different species respond in different ways. The ultimate objective is to educate hazardous bird species that the risk of remaining in the aerodrome environment outweighs the potential rewards that the airside environment may offer.

5.49 One of the key elements of effective deterrence is to avoid wildlife failing to respond to a technique (habituation[3]). Any system used should therefore only target wildlife when it is necessary. Human operated (active) control is more effective than automated (static) systems.

5.50 Several types of wildlife deterrence devices and techniques exist, some of which are examined in the following paragraphs. The objective of the role is to reduce the numbers of hazardous wildlife present on the airfield, not just to deploy a suite of techniques and methods. The following is provided as guidance for use in line with local conditions and requirements.

Species Group/Technique	Pyrotechnics	Distress Calls
Corvids (crows, ravens, rooks, jackdaws, jays, magpies, treepies, choughs and nutcrackers)	Y	Y
Pigeon Species	Y	Unverified
Gulls	Y	Y
Starlings	Unverified	Y
Lapwings	Y	Y
Curlew	Y	N
Birds of Prey	N	N
Waterfowl	Unverified	Unverified
Game birds	N	N

Figure 5 Species responsive to traditional non-lethal deterrence techniques

[3]http://www.animalbehavioronline.com/habituation.html

Distress Calls

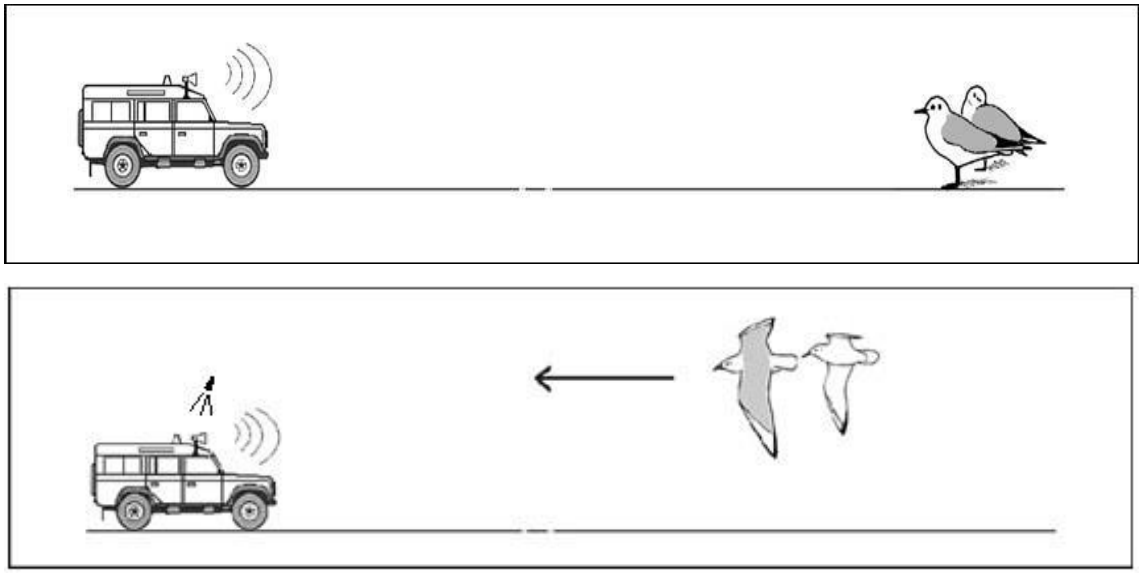
5.51 Many birds react strongly to signals that indicate danger, distress or death. Some birds, typically social species that communicate with each other vocally (such as gulls, lapwings, corvids and starlings) emit loud, piercing repeated distress calls when captured by a predator.

5.52 Different species react in different ways but in general, responsive flocks will react to a recorded distress call play-back in the field by showing alertness, lifting, taking flight and approaching the source of the call to investigate. In this manner, the operator can control the behaviour of wildlife by drawing them towards a vehicle, holding them overhead, then, when the broadcast is terminated, observe the dispersal. The likely reaction is for birds to gain height and depart (gulls and lapwings), or to resort to trees (corvids) or water (gulls) where they are safe. Foxes may approach the sound of a distress call as they investigate a possible food opportunity.

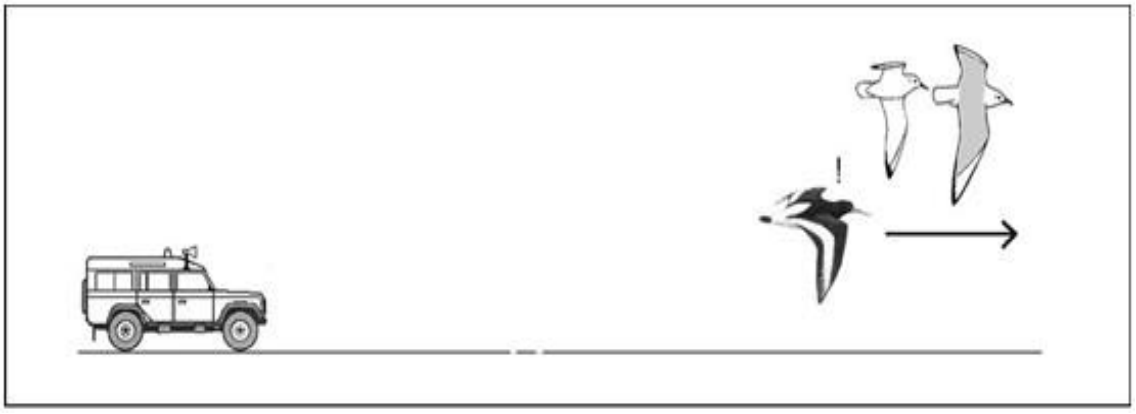
5.53 Distress calls can be purchased from various manufacturers on a variety of media including CD, handheld or bespoke vehicle mounted digital systems.

5.54 When using distress calls, the wildlife control vehicle should ideally be stationed approximately 100 m upwind of the target flock. This may require variation when considering the impact on aircraft movements. Driving at speed with distress calls playing serves to develop habituation as birds learn that there are no harmful consequences to the call.

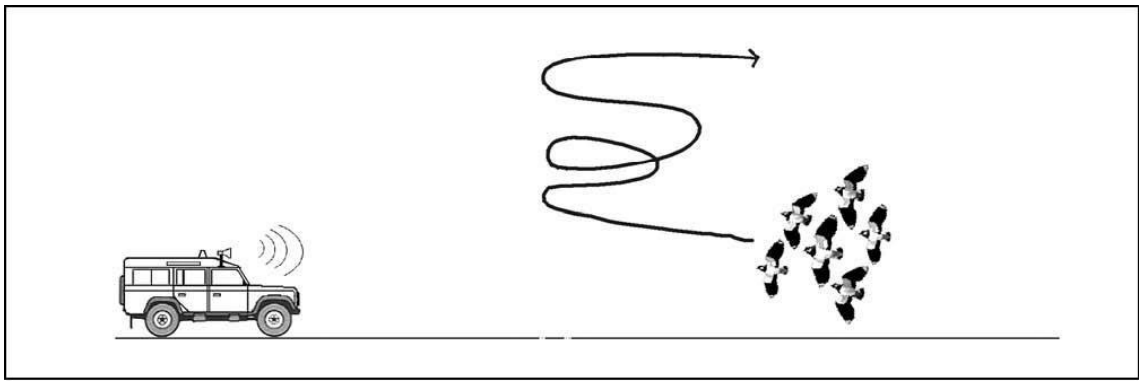
5.55 The target flock should be identified by species (or family group as a minimum) and where possible the species specific distress call recording selected. If several species are present, the recordings of the most numerous species should be played first. Birds should become airborne within 20 seconds of hearing the distress calls and approach the speaker. Throwing a lure up once (white for gulls and black for corvids), which resembles a struggling victim, can stimulate a flock to lift if necessary.



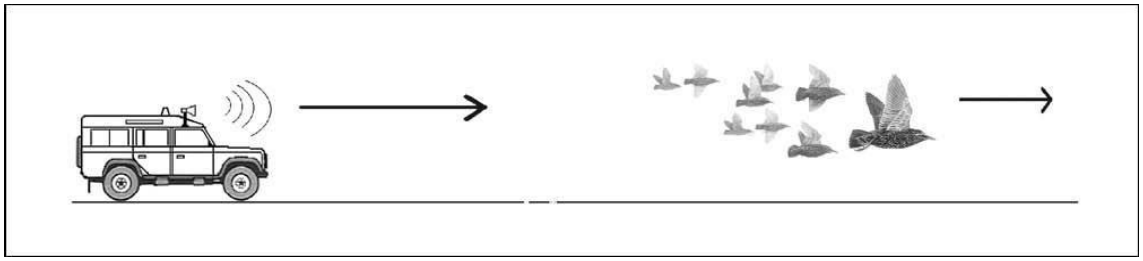
5.56 Once airborne, the flock will need sufficient time to approach and investigate the source of the calls before the broadcast is terminated. A broadcast should last no more than 90 seconds. Species that do not have distress calls will sometimes follow the lead of those that do.



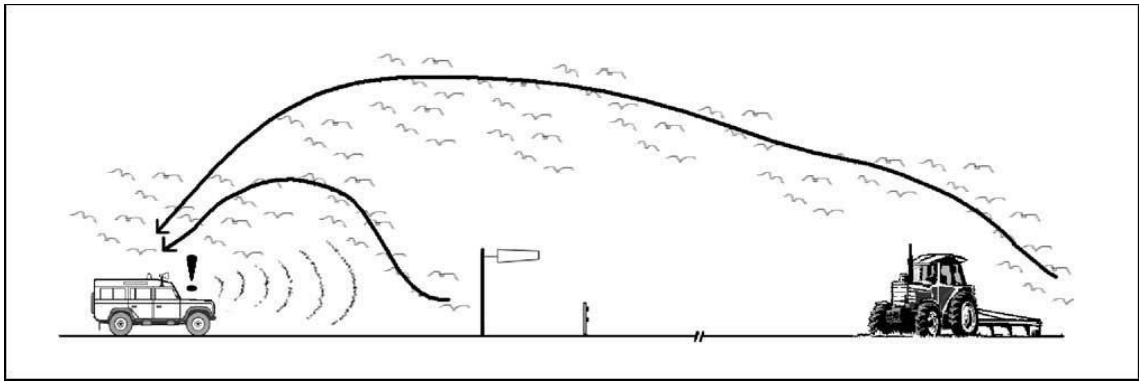
5.57 Lapwings often take flight and fly around in wide circles at some distance (as they are seeking the safety of an open environment to avoid danger and are keen to return to the airside environment) in which case it may be necessary to deploy pyrotechnics to control and stimulate dispersal.



5.58 Starlings commonly fly directly away from distress calls and it may be necessary to follow them slowly to prevent them from re-alighting. Local birds, especially corvids, after repeated exposure to distress calls, may eventually omit the approach phase of the response and depart immediately. Likewise, they may eventually habituate to the calls or approach of a familiar vehicle. It may be necessary to reinforce the efficacy of non-lethal control techniques with lethal control.



5.59 Volume settings need to be adjusted so as not to attract wildlife onto the aerodrome from distance. It is good practice to start the broadcast at a low volume and increase it until the target wildlife starts to respond if this is likely to be of concern.



Dispersal by a Pyrotechnic Bird Scaring Cartridge (BSC)

5.60 Use of a BSC is another common means of dispersing wildlife at aerodromes. Also commonly known as a "shell cracker", a BSC is, in its most typical form, a 12 bore shotgun cartridge case with the shot replaced by a projectile containing an explosive charge and delayed fuse/light trace, so that the projectile detonates at some distance from the gun. The response is usually an immediate departure away from the detonation so some directional control is possible over, for example, birds in flight, and the deterrence effect can be projected into areas beyond the firer's reach.

5.61 Several types of BSC are available. Generally, for use on an aerodrome, the BSC should:

1. have a range greater than 80 m when fired at a 45° elevation (i.e. a flight time of four to five seconds before detonation) to allow firing from outside the runway strip and to provide a reasonably effective area;

2. detonate between maximum and ½ maximum height when fired at a 45° elevation;

3. produce a sharp, loud "crack", with a bright flash.

5.62 A trace may enhance the effect of the BSC, especially when used to move a flock in a desired direction, and illustrates the projectile's trajectory, especially when it is deflected by the wind. The trace should be visible in sunlight throughout its flight.

5.63 The pistol should be fit for purpose, have a safety catch and be pressure tested for the type of BSC used. Pistols and BSCs should be transported in appropriate carrying cases and stored in a secure and safe location when not in use.

5.64 The BSC is the only device commonly available to the wildlife controller that, within the limits imposed by its range, is more rapidly mobile than the wildlife itself. Thus, it enables the direction of movement of target bird flocks, for example, to be controlled. By positioning themselves and aiming the pistol or shotgun appropriately, a wildlife controller can place the detonations behind wildlife to speed up their departure, and to either side to keep them on track and to hold a flock together. A BSC fired high in the path of an approaching bird flock will cause it to pause and orbit, even if it cannot be deflected altogether. However, birds will often avoid a significant headwind and, no matter how far they are pursued or how many BSCs are placed behind and to either side of them, they will eventually turn back. Directional control of the wildlife is helped if the BSC has a bright "tracer" component and adequate range.

5.65 In many circumstances, it may not be permissible to fire a BSC beyond the aerodrome perimeter but, by firing vertically, its effect can be extended outwards over a considerable distance, including locations such as in the approach path.

5.66 It is generally much easier to influence one large flock of birds to leave the aerodrome than several smaller ones. Firing directly into a flock will probably fragment it and the individuals may not re-group. This should therefore be avoided, unless they have ignored previous dispersal attempts and it is intended to increase the stress level, i.e. to achieve an effect similar to shooting. A very close detonation may be useful to disperse wildlife that re-groups quickly, such as flocks of starlings, but risks scaring as opposed to controlling.

5.67 A BSC should not be fired during a distress call broadcast. Operators should also be competent in their use, comply with relevant firearm and munitions legislation, and be provided with appropriate personal protection equipment (PPE).

5.68 The benefit of using a BSC in dynamic situations may be hindered if the Aerodrome Wildlife Unit needs to seek permission from ATC before firing each cartridge. Bird control personnel should be appropriately trained and have the necessary situational awareness in order to respond dynamically to each situation out on the airfield. The aerodrome operator should consider whether the benefits of being able to respond to dynamic situations could be hindered by the need to contact Air Traffic Control on each occasion a BSC is fired.

Manual Dispersal Techniques

5.69 Many wildlife are fearful of man especially those that are commonly shot as pests (e.g. corvids and pigeons) and traditional quarry species (wildfowl and waders). This fear can be used such that even exiting a vehicle can provoke a response. Wildlife controllers should be prepared to try other approaches including slowly raising and lowering the outstretched arms, which may be interpreted by the target wildlife as the wing beats of a large raptor. The person should be silhouetted against the sky, or a plain background, and facing the target wildlife. The extended arms should be slowly (one beat per two seconds) raised and lowered through approximately 30° about the horizontal. Almost all bird species will react by flying up and directly away. Birds to one side will not react, though birds behind may do so.

5.70 Arm waving may not cause wildlife to move very far, but departure is (predictably) directly away from the person. This is effective against all common species, can be used at short notice, where noise or pyrotechnics are unacceptable because of proximity to people or livestock, or because of fire risk, and have no cost.

Lures

5.71 Although whirling a leather pad with an attached wing on a string (lure) can be effective, throwing it high into the air so that it falls to the ground with wings "fluttering", invariably causes target flocks to fly up and directly away. This can work at ranges of several hundred metres. Wildlife reacts as if the lure represented an individual "in trouble". They may even approach to investigate, as with distress calls, if the representation is sufficiently realistic and, as with rag fluttering, the lure also appears to enhance responses to distress call broadcasts. Traditional falconer's lures, dead bird effigies, and even a tennis ball fastened in the corner of a black or white bin bag can prove useful tools.

Other Methods and Techniques

5.72 A number of other measures have been used with varying degrees of success, including:

1. flags;
2. plastic tape that vibrates and hums in the wind;
3. weighted plastic balls on water;
4. bird scaring rockets.

5.73 Birds of prey are often suggested as suitable for civil airport wildlife control. Target wildlife tends, however, to respond by fleeing the falcon thereby resulting in a

scaring activity with potential lack of control. Dogs are also extensively deployed and often used in conjunction with falconry. Any use of a programme that includes either dogs or falcons should be carefully evaluated prior to deployment.

5.74 All "scaring" systems should be avoided, as they can only provide "scaring" and not "control". It is important that all control techniques employed on the airside environment enable birds to be controlled away from critical airspace. Use of BSCs and rockets, particularly, may present a FOD hazard which should be managed accordingly.

5.75 Bird scaring techniques using visible lasers are being developed. The use of lasers on an aerodrome is subject to requirements specified in TP 19 - Guide for the Operation of Lasers, Searchlights and Fireworks in the Airspace of the Republic of Kosovo. Aerodrome operators considering the use of lasers for wildlife control purposes should consult the CAA for advice prior to operational use.

5.76 Trials have shown lasers to be a useful tool within an integrated bird hazard management programme, particularly when attempting to disperse birds in low light or at night or from an off-airfield environment.

5.77 Fixed systems that scan a beam across the runways and other airfields areas are in use at a number of European airports. Portable systems including laser torches, laser pens, laser rifles and laser pistols are also being used.

5.78 Any use of lasers on or near an airfield should only involve laser systems that are mounted on a tripod to ensure no risk of directional error and only in collaboration with airport and air traffic personnel. Risk assessments should be undertaken in the same way as for firearms for use on airports and should include information on the class of laser, safety procedures in place to prevent dazzling, and programme of work intended. The range of the portable systems developed specifically for wildlife control can be beyond 1.5 km with the result that suitable backstops are essential. They are highly directional and have little spread on the beam. They should not, however, be pointed directly at anything that could be dazzled, including wildlife. Laser systems have been deployed at night to successfully disperse gulls, starlings and corvids from their roosting locations. Trials have shown that there appears to be some variation in the effectiveness of colour with waterfowl responding better to red lasers and gulls better to green.

Repellents and Passive Deterrents

5.79 Repellents and passive wildlife deterrents rely on aversive stimuli that act through the senses of touch, smell and taste. Tactile repellents effective against wildlife include: sticky gels and filaments, used against roosting and nesting species on ledges and beams on buildings, and lines strung over restricted sites, such as swampy areas.

Birds in particular have limited chemical senses and generally can only detect aversive agents when taken into the mouth on food.

Lethal Control

5.80 All activities involving the use of firearms should be independently certificated by the certifying authority in Ministry of Internal Affairs ("MIA"). Applications for firearms permits should be made and certified prior to any use of weapons by an individual. Safe use, storage of guns and ammunition and record-keeping require separate and specific training by competent and qualified persons, security procedures and skills sets and are covered under separate firearms legislation.

5.81 When habitat management and active wildlife deterrence fail to reduce risk, the implementation of lethal control provides an essential option within the wildlife controller's armoury. The main benefit for deploying lethal control is to reinforce the effect of non-lethal control techniques. It can also be used to reduce numbers and thus to decrease a hazard.

5.82 Shooting wildlife therefore provides an effective tool for enhancing control. Special attention shall be paid on the legal provision that allows the shooting of certain wildlife on aerodromes, subject to specified conditions. These require an operator to be able to demonstrate that all acceptable non- lethal measures have been attempted prior to the use of lethal force. Control via firearms also requires specialist training and certification, whilst trapping requires technical knowledge and expertise.

Population Control

5.83 The implementation of lethal control to reduce or eliminate the presence of populations of wildlife on or around an airport requires a full understanding of the behaviour of the species being targeted. For example, the removal of a population of feral pigeons that reside in airport buildings on the airfield may be an essential prerequisite to proofing and preventing further invasions in that area. Likewise, species that have naturalised to the local environment may be effectively controlled through a programme of habitat and safeguarding controls, egg management and adult removal from key locations. Removal of populations of wildlife should therefore always seek expert advice prior to developing an appropriate strategy.

5.84 During the breeding season, the effectiveness of egg control will vary with species. Feral pigeons, if the conditions are suitable, can breed all year round and require permanent monitoring and action to have any effect. Gulls and many wading bird species will re-lay if eggs or nests are destroyed just once in a season.

5.85 Most shooting is carried out on an aerodrome as a last resort against intractable

flocks to deal with an immediate problem, but shooting can also be integrated into a control strategy to reinforce deterrence activities. In this situation, groups of wildlife that are becoming non- responsive to standard techniques (e.g. distress calls), can be shot. This can be particularly effective for corvids and gulls. When wildlife fails to respond to a distress call or deterrence operation, the shooting of an individual or individuals within the group reinforces the actual threat associated with the deterrence. Wildlife then re-associates the presence of a vehicle or the deployment of a deterrence method with the very real threat that it may be followed by lethal control. By this method, wildlife that is normally persistent and difficult to disperse from an aerodrome can be easily persuaded to move on. Active lethal control implemented to reinforce the use of non-lethal methods is thus an essential part of the active wildlife control operations.

5.86 It is possible for species to habituate to the use of lethal control particularly the deployment of shotguns. These have a limited range (circa 40m) beyond which wildlife will register that they are safe. In these instances, it may be necessary to utilise specialised long-range 12 bore cartridges or, under exceptional circumstances, deploy the use of rifles (e.g. .22 weapons) to remove wildlife that is not responding at a greater range.

5.87 Trapping and removing wildlife from an airfield requires specialist skills and experience and the law may limit some actions. Caution is also required to ascertain the method of trapping and how that would influence on-airfield wildlife activity; providing baited traps on an airfield has the risk of attracting other wildlife in from the wider environment hence specialist advice should be sought before implementing such a programme.

5.88 In some locations, small mammals may be a particular problem. Lethal control may therefore be an essential requirement for the removal of species that can both influence habitat and create an attraction. Any lethal control should ensure that all remains are removed from the airfield and disposed of appropriately to avoid becoming a carrion attraction themselves.

Safeguarding – Aerodrome Development

5.89 Safeguarding is the means by which an aerodrome operator assesses the impact that a proposed or existing development may have on the safety of flight operations on, or in the vicinity of, the aerodrome. Although safeguarding primarily addresses the potential infringement of flight safety surfaces, the potential for the proposed development to become a wildlife attractant site and increase the wildlife strike risk may also be addressed.

5.90 As outlined in Chapter 3, virtually all land types and land uses (including natural habitats) attract wildlife in some way. Aerodrome development should

address developments that, individually or as part of a cumulative process, could become wildlife attractants with the potential to increase the wildlife strike risk at a nearby aerodrome.

5.91 All aerodromes should establish their own Airport Protective Zones.

5.92 The following factors should be taken into consideration when assessing the potential increase in risk:

1. the numbers, including seasonal variations, and types of wildlife that may be attracted to the development;

2. any proposed landscaping or habitat designs;

3. the distance from the aerodrome;

4. the location of the development relative to aircraft arrival and departure flight paths and within the visual circuit; and

5. wildlife movements in relation to the aerodrome. Creating new bodies of water may cause more waterfowl movements and the increase of wildlife strike risk.

5.93 Ideally, informal discussions on a potential wildlife attractant development may take place between applicants and aerodrome operator before the submission of a planning application. This may make it easier to achieve a mutually acceptable outcome with regard to wildlife strike risk management.

5.94 Where an assessment shows that the wildlife strike risk may increase or could increase under certain conditions in the future, and the aerodrome operator and developer (applicant) are unable to agree a solution, an aerodrome operator could object to the planning application on safety grounds. The aerodrome operator may use local knowledge of wildlife populations and activities or an appropriate precedent of a similar safeguarding case to support the objection. The aerodrome operator may request that the objection cannot be withdrawn until measures to ensure there will be no increase in risk are implemented. It may be possible to modify a development (e.g. exclusion of food wastes from a new landfill) or impose planning conditions that require specific action to exclude wildlife or reduce their numbers (e.g. an effective WRMP). Where a safeguarding case is resolved through the imposition of planning conditions, it may be appropriate for the conditions (and a WRMP) to be subject to a legal agreement between the planning authority and the developer or property owner, or its successors.

5.95 The WRMP should identify the aerodrome personnel holding responsibility for the assessment of a proposed development with the potential to attract wildlife.

5.96 After planning permission has been granted, the aerodrome operator should regularly monitor the development for compliance with any planning conditions that are imposed and report any alleged breach or non-compliance to the local planning authority.

5.97 Although the designation and classification of national and internationally protected sites, do not require planning permission, the creation of new conservation sites commonly involves a number of different habitats and is usually associated with other developments that require planning permission and, as applicable, safeguarding consultation. Many nature reserves are created to protect particular flora or invertebrate communities, which do not represent a potential to increase the wildlife strike risk; however, others, such as estuaries, may be major wildlife sites. It is essential that the aerodrome operator establishes contact and works closely with agencies charged with the management of sites.

5.98 Further guidance on Aerodrome Development is specified in TP 08 – Aerodrome Development.

CHAPTER 6 - Wildlife Strike Reporting

Introduction

6.1 In accordance with the Regulation No. 09/2017 on Reporting, Analysis And Follow-Up Of Occurrences In Civil Aviation, every person, in the exercise of his/her functions, shall report to the Civil Aviation Authority of Kosovo all occurrences which endanger or which, if not corrected, would endanger an aircraft, its occupants or any other person.

Definitions

6.2 An industry-wide definition of what constitutes a confirmed, unconfirmed or near-miss wildlife strike occurrence has been standardised as follows. This gives guidance for the determination of confirmed and unconfirmed wildlife strike occurrences (shown in Tables 1 and 2). The definitions shown in Table 1 are based on the best practice standards produced by the International Bird Strike Committee (IBSC) and those adopted by the International Federation of Airline Pilots Association (IFALPA).

A. Confirmed Strike	Any reported collision between a bird/wildlife and an aircraft for which evidence, in the form of a carcass, or other remains, is found on the ground; or damage and/or other evidence is found on the aircraft. Bird/wildlife remains or complete carcass found on an aerodrome where there is no other obvious cause of death should be treated as a confirmed strike and reported as such accordingly. A bird carcass is found within the vicinity of the runway where there is no other evidence of death should be recorded as a confirmed strike, because it is a dead bird caused by an aircraft and was in close proximity to that aircraft. Such reports should be included within a wildlife management risk assessment process.
B. Unconfirmed Strike	Any reported collision between a bird/wildlife and an aircraft for which no physical evidence is found (i.e. no damage to the aircraft is evident upon inspection, and no bird remains, carcass or blood smears are evident on the airframe).

C. Significant Occurrence	Incidents where the presence of birds/wildlife in the air or on the ground resulted in an effect on a flight but where no physical evidence of an actual wildlife strike exists. This includes near-miss occurrences, rejected take-off and go-arounds.

Table 1 Wildlife Strike Definitions – Type of Strike

D. On-Aerodrome Wildlife strike	Any wildlife strike occurrence reported by the commander of an aircraft, where the aircraft is believed to be at a height of up to 1000 ft during climb out from, and/or below 200 ft during approach to the aerodrome.
E. Aerodrome Vicinity Wildlife strike	In the vicinity (within 13 km) of an aerodrome, any wildlife strike occurrence reported by the commander of an aircraft, where the aircraft is believed to be between 1000 ft and 1500 ft in the climb and between 1000 ft and 200 ft on approach
F. En-route Wildlife strike	Any wildlife strike occurrence where an aircraft is believed to be beyond 13 km from the aerodrome radius in the climb or not below 3000 ft on approach.

Table 2 Wildlife Strike Zones

Reporting

Wildlife strikes shall be reported to the CAA using CAA Form AACK/DSF/OR-FRM 05 available at CAA official web site and send to mor@caa-ks.org.

Species Identification

6.3 For the purpose of ensuring accurate reporting and to aid risk assessment, it is essential that wildlife species information is provided when a report is sent to the CAA. It is therefore important that every effort is made by the reporter to establish an accurate identification of the species of wildlife or wildlife that has been involved in the occurrence.

6.4 The aerodrome WRMP should clearly set out the procedures employed by operators in order to establish an accurate species identification following a wildlife strike. When this is carried out by local aerodrome wildlife control personnel, the WRMP should detail how their training and competence is achieved and maintained. Where species identification cannot be achieved locally, the WRMP should detail what other means might be utilised (i.e. by employing the services of specialist wildlife remains identification organisations). Remains can be identified via digital

photographic submissions of whole birds, major bird parts or occasionally feathering. Details of the aircraft type, phase of flight, location, time and date, altitude, etc. all add valuable information that may help to confirm identification at an aerodrome. Even where identification has already been achieved by staff on an aerodrome, confirmation enables the airport to have confidence in its risk management programme.

Figure 6 Remains following a birdstrike photographed on a suitable background, in focus and with a clear scale provided can be sent for Photographic ID confirmation (Herring gull)

CHAPTER 7 - Aerodrome Ornithology

Introduction

7.1 To assess the risks that they represent and to adopt effective control measures, wildlife control personnel should be able to identify the common bird species correctly, and be familiar with the ecology and behaviour of all wildlife commonly encountered on the aerodrome. This chapter provides guidance on the biology and behaviour of some of wildlife that may be found on aerodromes.

7.2 The CAA recommends that aerodrome operators seek specialist advice if necessary to help ensure that wildlife control operatives possess the skills and knowledge of wildlife species identification to enable them to discharge their duties effectively.

Wildlife Ecology

7.3 Each wildlife species fills a niche in nature, and its behaviour varies with season, time of day, weather and other factors. Its way of life is based on mobility: some species migrate to exploit seasonal food abundance and to avoid harsh winters; some species commute daily between safe roosts and feeding grounds; and some take flight to avoid predators.

7.4 Birds have sharp eyesight, communicate vocally and have good hearing over about the same range of frequencies as humans. They are unsusceptible to ultrasonic devices. Most birds have little or no sense of smell.

7.5 Birds observed in the field are almost always engaged in some activity that provides information about them. Song and call notes are often characteristic and, with experience, enable identification and even detection of unseen birds. Habitat and season are good indicators of species likely to be encountered. The following species represent the most commonly encountered birds on aerodromes. Their numbers will vary depending on season, time of day and location of the aerodrome.

7.6 Airport wildlife unit personnel would be expected to be able to competently identify all the commonly occurring species on aerodromes.

Specific Bird Behaviour

Birds of Prey

7.7 There is a common but false belief that wild birds of prey keep other species

away from aerodromes and that their presence on an aerodrome may be beneficial. Birds of prey are dependent on abundant prey, and will therefore be attracted to aerodromes with abundant small mammal or wildlife populations.

7.8 Flocks of smaller birds often mob birds of prey and the prolonged disturbance they cause could increase the wildlife strike risk on the aerodrome.

7.9 The kestrel is a small falcon, which hunts small mammals and large insects on farmland, aerodromes and in a variety of open habitats. Its preferred prey is especially abundant in permanent grassland and the kestrel is, therefore, common on aerodromes and alongside motorways. It is the only raptor that habitually hovers motionless on rapidly beating wings.

7.10 The sparrowhawk is a small short-winged hawk that hunts low over the ground, often using hedgerows or other linear obstacles as cover, to flush out small birds, which it catches with a rapid burst of speed.

7.11 The buzzard is a much larger wildlife of open country. It soars on long broad wings and takes carrion, rabbits and other small ground-dwelling animals as well as feeding on grassland insects and invertebrates.

7.12 Habitat management is critical for the control of birds of prey although a long grass policy is likely to be beneficial for species such as kestrels. Active control of small mammals is essential to reduce buzzard presence whilst proofing of perching areas will reduce opportunities for birds to reside on airfields. Active and rigorous deterrence is required and in many cases, removal may be required to prevent wildlife strike risks occurring.

Gulls

7.13 Gulls fall into two broad groups: “Small gulls” (Black-headed and Common); and “Large gulls” (Herring, Lesser and Great black-backed). Gulls feed predominantly on soil invertebrates when on aerodromes but can be found scavenging waste or hunting insects in the air. When construction works are being undertaken, gulls are often located attempting to find invertebrates within disturbed ground. Most often, however, they are encountered transiting an airfield when moving between their breeding or roosting sites, and feeding sites. These can include farmland, playing fields with short grass, sewage works, and landfill sites where food wastes are tipped. When not feeding, flocks spend long periods loafing on open undisturbed sites and commonly use aerodromes for loafing early in the day. During the breeding season, gulls of all species may be found nesting on rooftops of buildings both on and off the aerodrome. Some cities now support large numbers of gulls resulting in a year-round risk from this group.

7.14 The most effective tool for preventing gulls utilising an airfield is a good long grass policy and proofing of any suitable buildings.

Lapwings

7.15 Lapwings prefer open habitats with low or sparse vegetation, especially grassland, such as aerodromes. Hence lapwings may centre their activities on them for much of the year. Some aerodromes provide attractive habitat to small numbers of lapwing during the breeding season, but can attract substantial flocks of non- breeding birds towards the end of the summer. At this time, they may appear lethargic and reluctant to disperse because of the energetic strain of moulting. Once harvesting and ploughing are underway from August, making soil invertebrates particularly accessible, lapwing numbers on aerodromes decline as they move to exploit these seasonal feeding opportunities. They remain relatively scarce on aerodromes until October or November when large flocks reappear with influxes of continental birds. Unless hard weather settles in, wintering numbers can remain high until spring migration in February and March. However, prolonged frozen ground or snow cover prevents lapwings from feeding and they are forced to move to seek better conditions. The most effective tool for preventing lapwings residing on airfields is a good long grass policy.

Corvids

7.16 Rooks are gregarious and feed on soil invertebrates, grain and seeds, and roots on farmland and aerodromes. They find much of their food by vigorously probing the soil. They nest colonially forming rookeries in tall trees, where they return for security. Dawn and dusk flightlines and pre-roost assemblies may increase the risk of a wildlife strike occurring. Their foraging range is restricted to a few kilometres from the rookery when nesting. Consequently, the presence or absence of rooks on aerodromes in the breeding season depends on the size and proximity of the local rookeries.

7.17 Carrion crows and hooded crows are involved in very few wildlife strikes despite a ubiquitous presence on aerodromes. They occur in small numbers and, being resident, apparently establish routines that help them avoid aircraft. Their presence, however, signals to other wildlife that the area is safe and may result in greater risks than initially appears. Their diet includes carrion, small mammals and birds, eggs, animals, soil invertebrates, grain and fruit and waste food. On aerodromes, carrion or dead insects around runway lights may attract them to runways. They will drop hard-shelled prey on runways and taxiways to break it open.

7.18 Although common, jackdaws are involved in very few wildlife strikes. However, they associate commonly with other corvids and significant numbers may nest and/or roost in hangars. Jackdaws are very gregarious, often in mixed flocks on

farmland and aerodromes. Their diet is similar to that of rooks, but on grassland jackdaws feed on surface-dwelling invertebrates, rather than digging for prey. They also take small mammals, eggs, waste and chicks. They roost communally, again, often with rooks in woodland. They nest in cavities in hollow trees, buildings (including hangars), chimneys, quarries and cliffs. The jackdaw is an abundant resident, with numbers being swelled by continental birds during winter.

7.19 Experience has shown that the most effective way of controlling corvids on aerodromes is a good long grass policy along with suitable habitat controls to prevent nesting opportunities after which active control as per other species should be carried out.

Waterfowl

7.20 Waterfowl include the wildfowl (ducks, geese and swans) and also herons and cormorants etc. Some, such as geese and swans, are large wildlife and present a significant risk to aircraft operations. However, provided that any water habitats on aerodromes are effectively managed to exclude waterfowl, their presence is restricted to flightlines across the aerodrome, which in itself can be hazardous if not checked and understood

7.21 There are a variety of species of duck. Many are relatively large, heavily built birds that tend to fly in very close formation, and with the potential to cause damage to aircraft if involved in a wildlife strike. The most numerous species is the Mallard, often feeding on fields and aerodromes (when flooded), often at night.

7.22 The Grey heron, despite being a predator of fish and amphibians, can sometimes be found hunting mice and voles on aerodromes.

7.23 The most appropriate tool for preventing waterbirds from accessing aerodromes is to proof all waterbodies to ensure that they are unavailable to these species.

Pigeons

7.24 Woodpigeons are most numerous on well-wooded farmland, feeding on cereals, clover, rape, peas and other crops, weeds, acorns and beech-mast. They visit aerodromes mainly in summer, when weeds in long grass are flowering and seeding, and in late winter in search of clover leaves after acorn crops are exhausted and stubble fields gleaned bare or ploughed under. Outside the breeding season there are communal roosts in larger woods but flightlines are not well defined and are temporary, reflecting changes in feeding area. They fly between the roost and feeding fields (up to around 10 km, but further in areas with less arable land) throughout the

day. Feeding flocks are larger in the mornings. Later in the day, some birds return to the roost or perch in trees near the feeding fields, especially in the longer autumn and spring days.

7.25 Stock doves are often misidentified as woodpigeons or feral pigeons. Wildlife strikes involving stock doves tend to be concentrated in the early summer when they are attracted by weeds to aerodromes. Stock doves can occur as pairs or in small flocks, often with woodpigeons. Their food includes weed seeds, and stock doves are particularly attracted to very long grass with many wild flowers, especially vetches.

7.26 Feral pigeons are known to live on aerodromes, roosting and nesting in warehouses and hangars. In such sheltered environments, they can breed year-round. They are involved in wildlife strikes all year round.

7.27 Management of pigeon species is best achieved through an effective long grass policy, proofing of buildings and good housekeeping.

Starlings

7.28 Although the starling is involved in only a small percentage of wildlife strikes, they can form large and dense flocks during feeding bouts or prior to joining a roost around dusk. Most strikes occur during and after the breeding season when flocks of juveniles are difficult to disperse from aerodromes. Starlings are omnivorous opportunists, taking a wide range of food including worms, insects, seeds, fruit, cereals, household scraps and other waste. However, grassland is the most important feeding habitat and, on open land and aerodromes, flocks busily probe the ground with partly open bills. They progress over the ground with a characteristic "rolling" motion in which birds from the rear periodically take flight and move to the leading edge of the flock. Thus, they appear to be able to overcome at least in part the problem of detecting predators when foraging in aerodrome long grass. Starlings sometimes "shadow" livestock to prey on disturbed invertebrates and flies, and also "hawk" for flying insects when they are abundant (e.g. crane fly, ants).

7.29 Starling roosts can contain tens or hundreds of thousands of birds. Typically they roost in dense vegetation (not necessarily tall but usually difficult to penetrate): thorn thickets, game coverts, young un-thinned conifer plantations, reedbeds, etc. Starlings may travel long distances between roost and feeding areas. They nest between April and July in holes in trees, buildings and occasionally aircraft.

7.30 The most appropriate forms of management vary from a good long grass policy, through proofing of nesting areas and removal of roosting habitat. Starling roosts can be dispersed by scaring action for several hours at dusk on several consecutive nights. Considerable effort and resources (and specialist advice) may be required to evict starlings from roosts using pyrotechnics, distress calls and lasers.

Game Birds

7.31 The Grey partridges are squat, ground-living birds, often found on arable land in small flocks ("coveys"). They roost on the ground and are also active at night. They are very difficult to detect and flush from aerodrome long grass. They prefer very long grass or ruts on an aerodrome.

Swift, Swallow and Martins

7.32 Swifts, swallows and martins are summer visitors, which feed on flying insects. Flocks congregate where prey is concentrated by the wind, or where they arise: aphids over bean and cereal fields, midges over water, froghoppers and crane fly over grass. Large numbers can sometimes sit on runways in autumn in between feeding on aerial prey over airport grass.

7.33 The swift nests in holes in buildings and only alights at the nest. Small flocks engage in screaming chases. It ascends to height to spend the night on wing – "vesper flights" visible on radar over towns where breeding populations are concentrated. Swifts do not respond to dispersal action.

7.34 The swallow nests on ledges and beams in buildings. Flocks alight on runways and taxiways mainly in autumn. Flocks of swallows and martins feeding in flight usually resist attempts to disperse them but can sometimes be moved on when resting on the ground. The key to managing these species is a good long grass policy that includes suitable insecticide activity to prevent the presence of aerial insect emergences in the first place.

CHAPTER 8 – Training

8.1 As part of the Safety Management System requirements, based on Regulation No. 17/2017 on Aerodromes, Regulation No. 01/2014 on Professional Training of Employees and Other Aerodrome Contracted Workers, Providers of Ground Handling Services, and Users of Aerodrome Services Providing Self-Handling of Ground Handling Services ("Regulation No. 01/2014"), the Aerodrome Operator is obligated to establish and implement a training programme for personnel involved in the operation, maintenance and management of the aerodrome and for persons working unescorted on the movement area, or other areas.

8.2 The aerodrome wildlife control personnel should receive formal training prior to their initial engagement as wildlife controllers.

8.3 Professional training of aerodrome wildlife management employees shall include theoretical lectures, practical exercises and on-the-job training. Training shall include, but not limited to requirements stated in Article 37 of Regulation No. 01/2014 and at least, address the following general areas:

(1) an understanding of the nature and extent of the aviation wildlife management problem, and local hazard identification;

(2) an understanding of the national and local regulations, standards, and guidance material related to aerodrome wildlife management programs (use of best-practice models);

(3) appreciation of the local wildlife ecology and biology, including (where applicable) the importance of good airfield grass management policies, and the benefits they can deliver to wildlife control;

(4) the importance of accurate wildlife identification and observations, including the use of field guides;

(5) local and national laws and regulations relating to rare and endangered species, and species of special concern, and the aerodrome operators policies relating to them;

(6) wildlife strike remains collection, and identification policies and procedures;

(7) long-term (passive) control measures, including on and off aerodrome habitat management, including identification of wildlife attractions, vegetation policies, air navigation aids protection, and drainage system, and water body management practicalities;

(8) short-term (active) tactical measures, using well established effective wildlife removal, dispersal, and control techniques;

(9) documentation of wildlife activities and control measures, and reporting procedures (the aerodrome wildlife management plan);

(10) firearms and field safety, including the use of personal protective equipment; and

(11) wildlife strike risk assessment and risk management principles, and how these programs integrate with the aerodrome's safety management system.

8.4 Wildlife control staff should be fully aware of the conditions and terms of the operations of the aerodrome environment. Where this is not relevant, the wildlife control personnel should receive appropriate training, including:

(1) aerodrome airside driver training, including aerodrome familiarisation, air traffic control communications, signs and marking, navigational aids, aerodrome operations, and safety and other matters the aerodrome operator deems appropriate; and

(2) aircraft familiarisation, including aircraft identification, aircraft engine design, and impact of wildlife strikes on aircraft systems.

Recurrent Training

8.5 It should be ensured that wildlife control staff maintains competence in the role. This could be achieved either by regular training as per requirements set in the Regulation No. 01/2014. However, the maintenance of competence should include the areas in 8.3 and 8.4 above, and also include:

(1) reviewing firearms safety;

(2) changes in the local environment;

(3) changes in risk management policy;

(4) recent wildlife events at the aerodrome;

(5) improvements in active and passive measures; and

8.6 It is recommended to be undertaken on annual basis while more advanced training over longer intervals should be considered.

Certification

8.7 Successful completion of an airport wildlife training course should be demonstrated by completion of a (non "open-book") written and practical test. A written certification should be provided to those who successfully pass the test(s). If a published training procedure is not provided by the trainer the certificate should attest to the fields the trainee has successfully completed.

8.8 Training administered to any person for the purpose of conducting airport wildlife control should be documented and records retained for a sufficient period, as directed by the airport's wildlife control programme, or as necessary to satisfy periodic reviews or audits and evidence provided to the CAA upon request as part of an aerodrome certification audit.