

AERODROME SAFEGUARDING ADVICE NOTE

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1. Introduction

Aerodrome safeguarding ensures the safety of aircraft and their occupants when in the vicinity of an aerodrome by controlling potentially hazardous development and activity around it. For an overview of the safeguarding process see Advice Note 1 ‘Aerodrome Safeguarding – An Overview’, available at [CAST publications | Civil Aviation Authority \(caa.co.uk\)](https://www.caa.co.uk/publications/cast-publications).

This advice note provides an understanding of how wildlife hazards can have serious impacts on flight safety and what sorts of developments influence these hazards. Wildlife includes birds and animals; however, most wildlife strikes and wildlife strike safeguarding issues in the UK involve and relate to birds. Therefore, ‘wildlife’ strikes will be referred to birdstrikes in this guidance, to be more representative of the issues discussed.

2. Background

Aircraft are vulnerable to wildlife strike risk. Species such as deer, badgers and foxes can cause issues, however birds are the most problematic in the UK. Therefore, this advice note concentrates on birdstrike risk as it has resulted in aircraft losses and fatalities. Also, it is estimated that damage to aircraft and flight delays resulting from wildlife strikes around the world cost more than one billion Euros a year. The vast majority of birdstrikes occur on or close to aerodromes. Aerodrome operators are therefore required to take necessary steps to ensure that the hazard is assessed, and the risk is reduced to the lowest practicable level.

The International Civil Aviation Organisation (ICAO), (Annex 14 to the Convention of International Civil Aviation) states:

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

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

Aerodromes work hard to apply control and manage the risks posed by birds on the airfield through the implementation of effective habitat management and active deterrence measures. Birds moving between sites located off the aerodrome can increase the birdstrike risk, however the proactive prevention can often enable effective biodiversity and planning challenges to be met without compromising the very real risk to aircraft and flight safety.



The result of a bird strike - US Airways Flight in 2009. European Space Agency Image ©

Birds moving between sites located off the aerodrome can increase the birdstrike risk, however, proactive prevention can often enable effective biodiversity and planning challenges to be met without compromising the very real risk to aircraft and flight safety. Birdstrikes have the potential to result in damage or delays to aircraft operations. Different species of birds can reside within habitats around aerodromes at different times of year. Their presence has the potential for uncontrolled risk to arise should these birds move through the aircraft flight approach paths to an aerodrome or across the aerodrome itself.

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The precise mix of habitats and attractants around each individual aerodrome will affect safety considerations.

3. Safeguarding Strategies

As a general approach, any developments that have the potential to attract flocks of birds or large birds to the vicinity of an aerodrome should be assessed for their potential risk. The internationally accepted safeguarding area with reference to bird hazards is defined by ICAO as a 13km radius around the aerodrome reference point (ARP). Most birds utilise the airspace close to the ground with the majority of birdstrikes recorded below an altitude of 2000 feet. An aircraft on a standard approach to an airport enters this zone at a distance approximately 13km from a runway. Within this zone, aerodrome operators should conduct an inventory of sites that attract wildlife within a defined radius around the aerodrome, paying particular attention to sites close to the airside and the approach and departure corridors. However, the radius may be extended or reduced, based on a wildlife evaluation of the aerodrome vicinity.

The 13km zone should be seen as a planning guide and should a planning application that is likely to attract large numbers of hazardous (flocking or large) birds be presented outside this vicinity *it is possible* that the movements of birds could impact significantly on flight safety. Scavenging gulls, for example, are known to fly over 45 kilometres each way to exploit food waste and could generate flight lines *within the zone* that may increase the birdstrike risk at an aerodrome. Where doubt arises, planning applications outside the 13km radius should always be forwarded to the aerodrome for comment.

It is not possible to state whether the location of a planning application within (or close to the 13km zone) is an indicator of the level of risk it may provide. Applications would need to either increase the population of hazardous birds¹ within the vicinity of the aerodrome or generate flight lines that enter critical airspace. Local conditions and existing attractants and bird populations will always influence the risk posed by a new application. In order to understand the local conditions and their effect on the aerodrome, operators may determine to monitor off-aerodrome bird or wildlife activities in different ways to achieve the desired objectives and benefits. Off-aerodrome monitoring practices may be dependent and determined by the size and complexity of the aerodrome itself, the type of operating aircraft, the human resource available, the bird/wildlife hazard presented in the vicinity and results of any risk assessment (as noted in the aerodrome's wildlife hazard management plan).

In order to identify whether an application has the potential to increase the birdstrike risk at an aerodrome, features of the site that could attract hazardous birds should be assessed alongside the geographic location of the application in relation to other key attractants in

¹Large and / or flocking species capable of causing damage of aircraft

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the vicinity of the aerodrome. This process often requires specialist aviation knowledge and competence in the subject matter, an understanding of the risks posed by different species, the likely movement factors and any seasonal issues along with construction, development and final plan considerations. If an LPA has any doubt regarding the potential for wildlife issues, they should consult the aerodrome. Both manmade and natural landscaping features off-aerodrome can attract wildlife onto and aerodrome. These can include:

- Landfill sites
- Sewage works
- Building developments
- Drainage schemes
- Reservoirs
- Gravel pits
- Coastal areas
- Rivers and estuaries
- Woodland and agricultural land

The above points provide examples of the attractants that can be created as a result of developments that have the potential to increase the birdstrike risk.

4. Species Risks and Proximity

Flocking or large birds present the highest likelihood of resulting in flight safety concerns. Developments that attract waterfowl or gulls, for example, must be referred to the aerodrome operator. Dependant on proximity or location in relation to other sites, the development may still be permissible or may require an appropriate mitigation in the form of a 'Hazard Management Plan' to enable the development to gain planning permission.

Where a proposed development has the potential to attract birds, the developer will be expected to have undertaken a comprehensive bird hazard assessment, carried out by experts in the subject matter, to identify the risk(s) of species being attracted.

It is important to understand what constitutes a birdstrike risk and what constitutes a birdstrike hazard. The birdstrike hazard relates to the background population² of hazardous birds and their ability to have a negative impact on air safety. The risk is the likelihood of hazardous birds resulting in such impacts. This can be assessed by identifying the ability of

² The level and type of bird activity that would occur in the absence of any bird control measures.

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the application to increase the carrying capacity³ of hazardous birds in the aerodrome vicinity or to result in flight lines between attractants such as breeding, feeding and roosting sites that could impact aircraft movements.

Listed below are common hazardous birds found in the UK. This list is not exhaustive but provides an indication of the kinds of birds that require consideration when assessing planning applications, noting that other species may also have the potential to increase the hazard. In general, large birds (waterfowl, large birds of prey etc.) and flocking species (Starlings, Lapwings, Pigeons, Gulls etc.) present the greatest hazard.

- All wildfowl (Ducks, Geese and Swans)
- All large waterfowl
- Herons
- Egrets
- Cormorants
- Gamebirds (Pheasants & Partridges)
- Birds of prey
- Large waders (Lapwing, Curlew and Golden Plover)
- All gull species
- All Pigeon species
- All Corvid species (crow family)
- Starlings

Safeguarding should take a proactive, precautionary approach and as such, the potential attraction of a site to hazardous birds should be used to inform safeguarding decisions. The potential for a birdstrike risk to then develop depends on several factors, for example the species of birds present, the types of aircraft operating, the presence of other habitats in and around the vicinity of the aerodrome and the frequency of aircraft movements. The time of year will also need to be taken into consideration in respect to which species will be more prevalent across certain sites.

Where a significant hazard is identified, the developer will be expected to modify their proposals to mitigate the risk or, should the increase remain unacceptable, may find their application remains subject to a sustained objection from the aerodrome operator. To lift any objections, it is possible that further to habitat modifications, a results-based Wildlife

³ The maximum population size of the species that the environment can sustain indefinitely, given the food, habitat, water, and other necessities available in the environment.

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Hazard Management Plan (WHMP) could be agreed with the aerodrome operator. The long-term efficacy of all mitigations proposed would need to be fully auditable by the aerodrome or their nominated representatives.

To avoid delays in the planning process it is suggested that developers consult with relevant aerodromes at a preliminary stage and follow the design advice provided in aviation flight safety guidance material. Further information is available in CAA Publication 'CAP 772: Wildlife Hazard Management at Aerodromes' available at www.caa.co.uk.

5. Development Types

As there are many types of development, the following examples are given to help identify the potential to attract hazardous species. The final decision on whether a site may or may not result in a risk to flight safety will be dependent on location, proximity and relation to other existing wildlife sites and corridors at each individual aerodrome.

Development Type	Specific	Species concerns
Waste Management	Landfill Composting Recycling Treatment	Feeding opportunities for potentially large numbers of scavenging birds e.g. Gulls, Corvids, Starlings, Pigeons, Raptors.
Water	Nature Reserves Reservoirs Ponds River diversions Sewage/Water Treatment	Diversity of feeding, loafing, breeding and roosting opportunities for Waterfowl, waders and gulls e.g. Swans, Feral and Wild Canada, Greylag and 'grey' geese, Gulls, Ducks, Herons and Egrets, Wading birds such as Lapwing, Oystercatcher etc.
Wetland	Nature Reserves Marshland Reedbeds Swales SuDS Schemes Drainage schemes Flood Alleviation Works Managed retreat	Feeding, roosting, breeding, and loafing for Waterfowl, passerines, <i>hirundines</i> e.g., Swans, Feral and Wild geese, Ducks, Herons and Egrets, Gulls, Wading birds etc and potential for large Starling or Swallow roosts to form (e.g., Reedbeds).
Sports facilities	e.g., Golf course open grassland, watercourses Fishing lakes Sailing clubs	Landscape developments risking feeding, loafing, and breeding opportunities for different species such as Canada Geese, Gulls, Pigeons,

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		Corvids, Starlings, Herons and Egrets etc.
Property development	Housing Factories Industrial Estates / Units Mineral extraction Green roofs	Diverse human factors and built environment providing food and shelter for urban species such as Pigeons, Gulls, Corvids, Starlings etc.
Rural	Woodland plantations Pig rearing facilities Poultry facilities	Potential feeding, nesting and cover for species such as Pigeons, Gulls, Corvids, Starlings, Game birds etc.
Energy	Solar farms	Potential perching and breeding opportunities for Gulls, Corvids and Feral Pigeons.
	Tidal barrage	Changes to waterfowl / wader behaviour / distribution.
	Energy plantations	Provision of potential roosting habitat for passerines (Starling).

Whilst solar farms (PV arrays) have the potential to provide some attractants (perches, shelter, and recesses for breeding), peer-reviewed research⁴ suggests that “PV arrays would not increase hazards associated with bird-aircraft collisions”.

Research in this field is still in its infancy, and a precautionary approach should be taken when assessing birdstrike risk associated with a planning application on a case-by-case basis. Natural England⁵ state:

‘Until further scientific evidence is accrued to support any positive or negative impacts of solar farms on birds, we recommend that developments should be considered on a site-by-site basis with consideration given to 1) the habitat available

⁴ *Bird use of solar photovoltaic installations at US airports: Implications for aviation safety*

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⁵ *Evidence review of the impact of solar farms on birds, bats and general ecology (NEER012)* 1st edition - 9th March 2017, Natural England

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prior to the development, 2) the habitat that will co-occur with the development and 3) the potential for attraction to polarotactic insect species (i.e., is the development close to a water body)'.

Insects attracted to PV arrays are likely to primarily attract passerine species not considered hazardous to aircraft. In addition, there is the possibility that PV arrays may provide fewer attractants than existing habitat (either open land or open flat roof habitat), so each application should be assessed individually as some may have the potential to reduce the presence of current hazardous bird populations.

If a proposed development involves the removal, storage, and redistribution of fertile topsoil, this can expose significant populations of invertebrates and small vertebrates. These can provide significant feeding attractants for Gulls, Corvids (the Crow family) and Starlings. Whilst such attractants are generally short-lived, they have the potential to increase risk that may be significant to the aerodrome. If there is doubt about a development, a second opinion in relation to birdstrike concerns should always be sought.

The range of individual considerations and the potential attractions that can arise from just one of these developments are given below. This provides a demonstration of the depth of concerns that may arise and the considerations that are necessary. Even if a building or development itself does not present apparent attractants, the construction phase might, for example due to standing water and the disturbance of soil. Many hazardous bird species are adept at exploiting these conditions, hence the construction phase should always be assessed with suitable mitigation put in place.

Development	Type	Attraction
Example: Industrial Estate Development	Development site - ground works	Corvids, Gulls & scavenging birds feeding on soil invertebrates
	Development site - standing water	Loafing or bathing gulls and dabbling ducks (Mallard). Potential for feeding (e.g., Grey Heron)
	Development site - human factors	Worker's cafeteria or mobile food outlet; waste food attracting Feral Pigeons, Starlings, Corvids or Gulls.
	Construction works	As above
	Construction works - buildings	Unfinished buildings providing nesting grounds for Feral Pigeons
	Completed works - rooftops	Open flat roofs – breeding / roosting habitat for roof nesting gulls

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	Completed works - landscaping	Tree planting or hedgerows presenting nesting opportunities for Woodpigeon / Rook and berry, fruit or nut provision providing food for Thrushes, Starlings, Pigeons etc.
	Completed works - SuDS	Drainage swales resulting in streams, ponding / open grassland etc. suitable for waterfowl.

The above table shows the depth of consideration needed to determine whether an apparently unattractive development may result in a birdstrike risk. Similarly, assessments of clearly attractive sites e.g., waste disposal facilities would need reviews based on other factors. Another example is given below.

Development	Concern	Risk
e.g., Landfill	Waste disposal	Thousands of scavenging gulls, corvids, Starlings etc.
	Location	Proximity to aerodrome
		In relation to gull roosts
		In relation to rookeries
		In relation to Starling roosts
Flight lines	In relation to other feeding sites	
		Proximity / probability of crossing aerodrome or approaches

Sites that result in increased risk during construction are likely to be located in relatively close proximity to the aerodrome, or beneath the aerodrome approaches hence a responsible development should address all aspects of the works to ensure that both the construction and final outcome are appropriately managed.

6. Management Controls

National and international guidance material, alongside experts in birdstrike management can help provide the necessary detail for reducing the potential risk from developments to levels acceptable to an aerodrome operator. If a specific development cannot be suitably controlled, early consultation with the aerodrome should at least enable the developer to consider alternative locations.

Where developments can be appropriately controlled, an example of potential actions is provided in the case where buildings may provide flat roofs for nesting gull colonies or

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ledges and gullies for Feral Pigeons, Jackdaws and Starlings to establish nest sites or perching areas. In addition, solar arrays can provide similar attractants. Opportunities to reduce the risk from rooftop design could include:

- Netting to proof roofs and exclude hazardous species as required.
- Roof overhangs kept to a minimum.
- Ledges beneath overhangs and external protrusions avoided where possible.
- Redesign roof to steeply pitched to deter gulls from nesting, roosting, and resting.
- Lighting structures proofed to prevent perching.
- Solar arrays to be designed close-fitting to reduce potential perching / nesting opportunities.
- Choice of roof material to reduce attractiveness (smooth surfaces with minimum protrusions or vents to reduce breeding opportunities).
- Roof spaces to be designed in such a way as to prevent access by birds.
- Self-closing doors to prevent access to birds or openings fitted with netting or plastic strip enclosure materials.
- Safe access enabled for on foot access to all areas of roof that cannot be proofed.
- Outside dining areas enclosed or avoided near an aerodrome.
- Green and brown roofs near an aerodrome not to be included in the design.

7. Monitoring & Inspections

Developments that have been carefully considered for wildlife hazards may have a combination of methods or standards attached to ensure any residual attractants that cannot be designed out do not increase risk to an aerodrome. As these planning requirements may be essential to the safe development and operation of a site, they may need to be independently reviewed to ensure they continue to be effective. Wildlife Hazard Management Plans should therefore be results based, to enable the applicant to be flexible in their approach. Should circumstances change and species of concern no longer be present, less effort may be required to meet the needs of a results-based plan. Equally, should an approach fail to achieve the desired results, additional effort may need to be established. In order to develop a results-based WHMP, all interested parties need to agree on achievable threshold figures that will result in no further increase in background populations or risk to the aerodrome, i.e. the number of each species that can be tolerated on site before deterrence should be carried out.

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An aerodrome will derive such a threshold figure from an estimation of the background population⁶ of that species in the local area in combination with potential risk to aircraft. An increase above the background population would be indicative of increased risk. A precautionary approach to the setting of the threshold figure will be adopted in the absence of robust ornithological data specific to the development. If WHMPs are necessary for breeding birds, the threshold figures shall be set at zero (as measured by breeding success). In order for the efficacy of BHMPs to be audited, records of actions taken and results must be kept and a programme of audit agreed.

During the breeding season for gulls, for example, inspections to assure compliance with a 'no breeding' WHMPs should be carried out at least weekly during the breeding season (typically April to June), in order to ensure that all hazardous birds found nesting are dispersed and any nests and/or eggs are removed. This process should be fully documented to provide an audit trail and will require separate licensing if required.

For roosting or loafing (resting) birds, regular inspections should be carried out and if the threshold level is exceeded then birds should be dispersed. The frequency of inspections should be dictated by the presence of hazardous birds and be sufficient as to ensure the efficacy of the plan. This process should be fully documented to provide an audit trail and compliance site visits from the aerodrome operator may be required, subject to the necessary Health and Safety considerations.

If a development is close to the critical airspace of an aerodrome, then it may be necessary to have a communication plan in place to contact Aerodrome Operations staff at the aerodrome concerned before any required bird dispersal takes place. In some cases, developers have engaged pest control companies to carry out inspections and bird deterrence on their behalf.

It is important that if bird numbers at a development increase and bird deterrence methods are not proving effective, a process to ensure the aerodrome operator is informed should be included in any WHMP.

Important measures that **may** be included in a WHMP are provided here for general guidance only:

⁶ The level and type of bird activity that would have occurred prior to the development.

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- Confirmation that access to all areas of the site is available and by what method, to ensure that inspections can be carried out (See CAA Publication 'CAP 772: Wildlife Hazard Management at Aerodromes' available at www.caa.co.uk).
- Confirmation that an appropriate inspection schedule is to be operated.
- Confirmation that any control is to be carried out under appropriate licences.
- Details of bird species and, where applicable, species behaviours that will be subject to management plans along with clearly designated thresholds to define when dispersal actions should be instigated and what they should achieve.
- Information on communication plans to contact Aerodrome Operations staff at the aerodrome concerned before bird dispersal takes place (in line with agreed thresholds).
- Details of any dispersal methods to be used.
- An auditable record of all BHMP information to be maintained detailing: dates, times and description of monitoring carried out, species and number of birds recorded, dispersal effort provided and the results of any dispersals.
- Provision for the aerodrome to inspect the records and undertake no-notice visits to the site (where necessary).
- Duration of the WHMP linked to the site and not the site owner or operator.

Early pre-planning application consultation with the aerodrome operator on the content of a WHMP is recommended. It is important that the aerodrome seeks to ensure that WHMPs are results-based, enabling the efficacy of the plan to be assessed in a fair and transparent way. Results-based WHMPs also enable the applicant to develop the WHMP in the most cost-effective way, as they are less prescriptive than plans detailing the equipment to be used. Please contact the aerodrome to discuss their requirements.

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Further CAST Safeguarding Information is available at <https://www.caa.co.uk/combined-aerodrome-safeguarding-team-cast/>.