SUPPLEMENTARY ADVICE FACTSHEET

Designing wildlife ponds to minimise the risk of birdstrike

MILLION PONDS PROJECT
Pond Conservation

A 50-YEAR PROJECT TO CREATE A NETWORK OF CLEAN WATER PONDS FOR FRESHWATER WILDLIFE

1. What is birdstrike?

Birdstrike is the collision between birds and man-made structures. The main concern is usually collision with aircraft, particularly where birds hit windscreens or fly into aircraft engines. Aircraft birdstrike is a significant health and safety issue. It has resulted in human fatalities and causes aircraft damage, with an estimated global cost of up to £1 billion per year (Allan, 2002).

Air traffic is heavy over the UK, with around 7,500 aircraft in the skies every 24 hours, including commercial flights, private charters and a large number of military operations. As a result, major stakeholders, including the UK regulatory authorities, the Civil Aviation Authority (CAA) and the Defence Infrastructure Organisation (DIO), aim to minimise the risk of birdstrike as far as possible.

New waterbodies can create an increased risk of birdstrike, particularly if they attract large or flocking birds (Figure 1 and 2), into the conflict zone (defined as anywhere within 13km of an airport). However, only creating new waterbodies outside high risk areas is not always appropriate. Over 44% of England falls within a birdstrike conflict zone and, for example, over 50% of the UK's potential mineral resource (e.g. sand and gravel) is found within this area. Preventing gravel extraction, and the subsequent creation of gravel pit lakes across England and Wales is economically undesirable, so a common solution is to seek a compromise in restoration design.

What's in this factsheet?

2. Ponds and the risk of birdstrike

Small waterbodies, including ponds, generally create far less of a potential problem for birdstrike than larger waterbodies like gravel pit lakes. However, in high-risk areas close to civilian or military airports there are measures including good pond design and location that can be used to minimise birdstrike risk whether real or perceived. This factsheet explains how.

Figure 1. Large waterbodies attract flocks of birds such as gulls and large waterfowl like swans and geese. In some areas this can increase the risk of aircraft birdstrike to unacceptable levels.

But, small waterbodies are unlikely to attract conflict species especially if they are designed to minimise birdstrike risk, so:

- Create small waterbodies
- Make shallow ponds
- Encourage tall marginal vegetation
- Choose sheltered locations for pond creation

Figure 2. Problem bird species

Most bird species do not pose a significant risk to aircraft. The main problems are from:

(a) large birds e.g. those bigger than 1kg such as Canada Geese *Branta canadensis* and

(b) birds that typically flock in groups of more than 10 individuals e.g. gulls (Milsom, 1990).

Small birds which don't flock, and those which rarely take to the air e.g. Coot *Fulica atra* or Moorhen *Gallinula chloropus*, do not form a significant threat.

The main problem birds

Gulls are attracted to waterbodies greater than 200m wide, because they use expanses of open water to shelter on overnight. They will also use unvegetated islands in the middle of large bodies of water as breeding and roost sites.

Gulls will also be attracted to a site if there is good feeding habitat nearby, such as landfill sites or recently tilled arable land. Large flocks moving between feeding and roost sites can pose a serious threat to aircraft.

Swans and geese are attracted to large bodies of water, particularly those with islands. They can also be attracted to ponds adjacent to short grasslands and to areas where they are fed by the public.

Creating ponds which are attractive to these large birds *outside* of the conflict zone can be useful to draw them away from danger. However, migration routes, and flight paths to and from feeding grounds should also be considered and avoided.

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Wading birds and dabbling ducks are restricted to shallow waters because they are limited by the depth of water they can feed in. They are very sensitive to perceived predation threats and will take to the air frequently in large flocks.

They avoid areas with adjacent cover such as scrub and woodland because they like to have wide open vistas to spot both land and air predators. Many, including Lapwing *Vanellus vanellus* like to have pasture adjacent to the pond, to provide nesting opportunities.

Herons *Ardea cinerea* and Cormorants *Phalacrocorax carbo* are both associated with ponds and lakes with fish. Herons prefer ponds with extensive edge habitat and will also be attracted to ponds on the margins of reedbeds. Cormorants prefer deep open water into which they can dive for food.

Large flocks of Starlings *Sturnus vulgaris* can also cause a significant threat to planes. They are particularly associated with large areas of reedbed which they use as roost sites. A complex of small ponds will not provide a large enough area to attract these birds.

3. Surrounding land use

On some sites, it may be possible to create some larger ponds as part of the complex ***if*** the surrounding land-use is unlikely to draw in additional numbers of large waterfowl or waders.

The background risk

By law, the creation of waterbodies should ***not significantly increase*** the risk of birdstrike in an area above the ***background level***. Larger ponds in areas which already have existing short pastures, river valleys and a large number of waterbodies are unlikely to increase the background risk of birdstrike further.

Avoiding problem areas

Some activities in the wider landscape surrounding the pond can exacerbate the risk of birdstrike, so.

- **Locate large ponds away from the airfield.** The majority (75%) of strikes occur below 500 feet and over 90% below 2,300 feet (Eschenfelder, 1998). Thus it may be possible to create larger ponds as part of a pond complex on the ***outer boundary*** of the conflict zone.
- **Locate ponds in unimproved grasslands.** Swans and geese need short lush turf on which they graze, i.e. improved grasslands. Low intensity grasslands which have ***low nutrient content*** (e.g, those with little or no fertiliser input) tend to be avoided. However, even within low intensity grassland it is advisable to use the shelter of hedgerows or scrub to create a complex of small ponds and still avoid creating large waterbodies.
- **Locate ponds away from landfill sites and arable land.** They often provide a focal point for large flocks of gulls and other birds. This can be particularly problematic at dawn and dusk as they move between feeding areas and roosting waterbodies. Again, large waterbodies are not suitable here, but a complex of small waterbodies may be feasible.

Ponds and people

Ensure that public use of the site does not allow feeding ducks, swans and geese, since this will maintain numbers higher than would occur naturally. Where feeding might be an issue, use signs to ask people not to feed waterfowl and explain why.

Figure 3. This pond will not attract bird species that would pose a birdstrike risk. The pond also has very high biodiversity value because it has clean water, shallow margins and forms part of a complex of ponds.

4. Pond design principles to reduce the risk of birdstrike

Our knowledge about which birds pose the greatest risk of birdstrike can be used to design ponds that are unlikely to create problems (Figures 3-5). Fortunately, most of the design features needed to deter unsuitable birds are also features that make great wildlife ponds.

Create small waterbodies

The large and flocking bird species most likely to be involved in birdstrike are those attracted to large bodies of water. So within the conflict zone, focus on creating a complex of small ponds (see Box 1) rather than a single large waterbody. This will also have the benefit of increasing the diversity of habitat for both plants and invertebrates.

Box 1: What is a pond?

Ponds are permanent or seasonal waterbodies between 1m^2 and 2 hectares in surface area. It is difficult to be prescriptive about the size of pond needed to deter birds in the conflict zone, as it will depend on a combination of the surrounding habitat type and pond location. For example:

- In grazed grasslands create a complex of ponds between 1m^2 and 300m^2, but locate them on the field edge adjacent to cover.
- In woodlands, it is possible to create some larger ponds (~2000m^2) as part of a complex. These will retain open water beyond the tree canopy (see *Supplementary Habitat Factsheet: Woodlands*). If these are shallow (max. 50cm) they are unlikely to attract birds which pose a birdstrike risk.

Make shallow ponds

Ponds do not have to be deep. In fact, water over 1m often adds little additional value to the pond. The important zone for most plants and invertebrates is the zone of emergent and floating-leaved vegetation where the water is less than 30cm deep. Diving birds, such as Common Tern *Sterna hirundo*, will not be interested in water this shallow and wading species such as Dunlin *Calidris alpine*, will avoid them if they are also sheltered and surrounded by taller vegetation.

Another advantage of such shallow ponds is that they are more likely to periodically dry out and so will not support fish which might attract Herons. Temporary ponds like these are also a very valuable habitat type for many freshwater species.

Encourage tall marginal vegetation

Ponds with large areas of open water can attract flocks of Cormorants, gulls, geese and the like. Limiting the amount of open water by increasing the amount of tall marginal vegetation will reduce the pond's appeal to these species. Swans and geese also like to have a number of access points to and from the open water to areas of grazing habitat. Thick fringing vegetation will eliminate these routes. Tall marginal vegetation will also reduce the suitability of the pond for large numbers of waders, who like large areas of short turf or bare ground in which they can probe for food.

Creating ponds with wide shallow edges, that slope very gradually to around 30cm depth, will allow tall marginal plants to colonise. Do not plant-up larger waterbodies with stands of dominants e.g. Common Reed *Phragmites australis* - although emergent plants will help to reduce the amount of open water on large waterbodies, reedbeds can sometimes attract flocks of roosting Starlings particularly during the winter months (October – March). If flocks of more than 6000 birds start to gather they may need to be dispersed. In small ponds the cover of reedbed is unlikely to be extensive enough to attract large flocks.

Sheltered sites are better

Ponds located adjacent to woodland, hedgerows or scrub, are avoided by many birdstrike risk species because they prefer wide views across open landscapes to have advance warning of predators.

Large trees may attract other problem species such as roosting corvids (crow family). Therefore, locating ponds adjacent to hedges, scrub or coppiced trees will be more suitable in the conflict zone. Many pond plants and invertebrates thrive in sunny sheltered ponds. The adjacent scrub will also increase the amount of terrestrial habitat for amphibians.

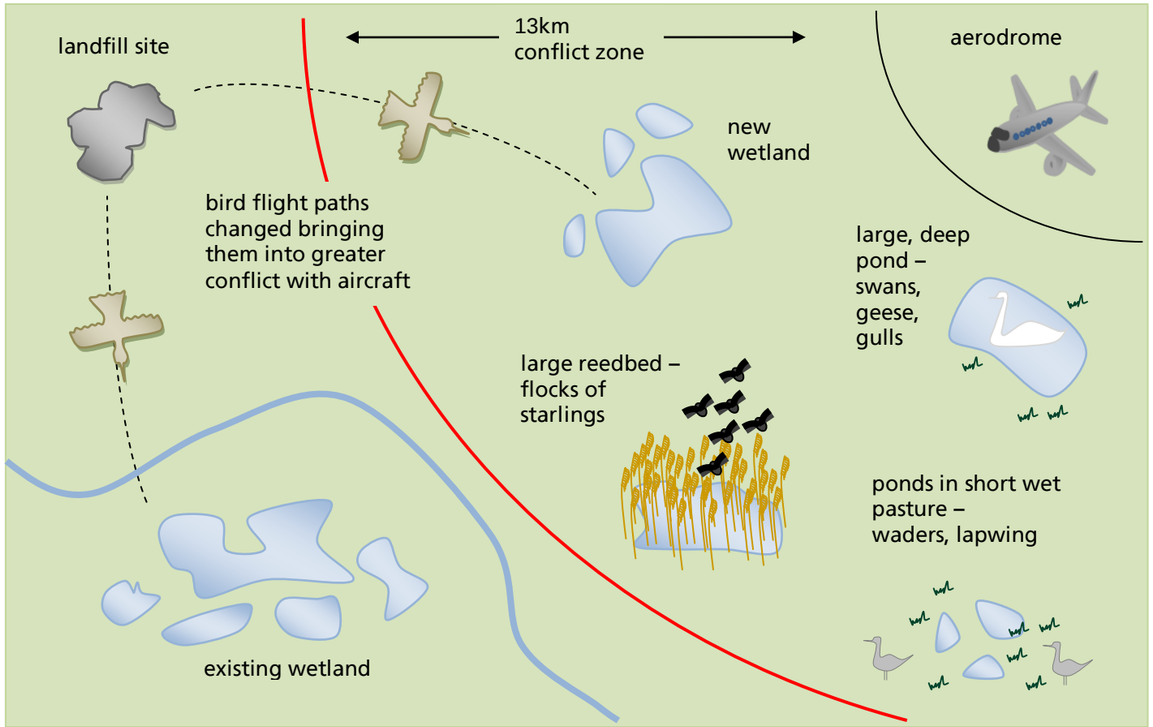
Management to reduce birdstrike risk

Light grazing by stock is an optimal management regime: it will not reduce vegetation height significantly but will increase the diversity of marginal pond plants and prevent any one species from dominating.

Where grazing is not a feasible option, cutting the pond margin annually can be used to reduce scrub encroachment and maintain sward diversity, preventing scrub from completely overshading small shallow ponds.

Figure 4. Good pond designs to avoid birdstrike

☒ Poor pond design and bad pond location = HIGH BIRDSTRIKE RISK

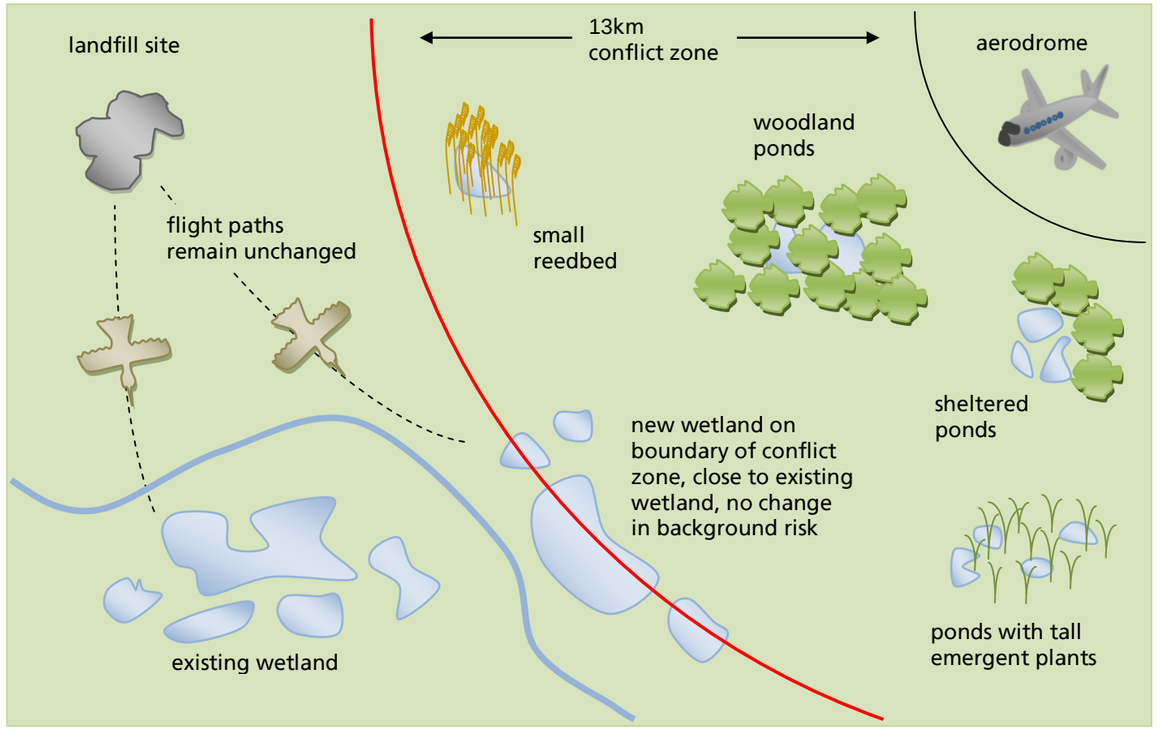


Large ponds, wetlands, and ponds in poor locations will attract birds which pose a risk to aircraft

AVOID:

- × New wetlands which bring birds into the conflict zone, especially where this changes the flight path from exiting feeding sites (such as landfill and arable land) to new roost sites on the open water.
- × Large deep ponds, which will attract swans, geese, diving birds and flocks of gulls. These are very attractive to birds if they are surrounded by improved nutrient rich grasslands or where the public regularly feed wildfowl.
- × Areas of open water close to the aerodrome perimeter which will bring birds into direct conflict with planes during landing and takeoff.
- × Large reedbeds can reduce the area of open water but may also attract flock of Starlings which would need to be dispersed.
- × A complex of ponds in short wet pasture which will be very attractive to breeding and wintering waders.

☑ Good pond design and strategic pond location = LOW BIRDSTRIKE RISK



Well designed ponds in conflict zone are not used by birdstrike risk species

CREATE:

- ✓ New wetlands on the border of the conflict zone, especially in areas with existing wetlands. These will be unlikely to increase the number of birds significantly above the existing birdstrike risk.
- ✓ A complex of small, shallow ponds which are located adjacent to shelter, such as hedgerows or woodland. These will not attract species which pose a birdstrike risk.
- ✓ Ponds in unimproved grasslands and reduce the grazing pressure to increase vegetation height. These will not attract species which pose a birdstrike risk.
- ✓ Large shallow ponds in woodland. These will support many pond plants and animals but are not attractive to birdstrike risk species because of the surrounding tree cover.
- ✓ Small reedbeds to deter large and flocking waterfowl and waders. Small reedbeds will not be large enough to attract Starlings. Pools of deeper water within the reedbed can be excellent for submerged and floating-leaved plants, provided ponds are created in areas of clean water, i.e. low intensity catchments with no artificial fertiliser inputs and no pollution runoff.

Figure 5. Valuable wetland habitats such as this will attract large numbers of flocking birds many of which are declining nationally. Creation of these habitats is better suited to areas outside the birdstrike conflict zone.

5. Action checklist to minimise the risk of birdstrike

Pond creation plans that include effective measures to avoid birdstrike risk at an early stage are unlikely to cause problems, or be the subject of objections. However, because of the risks involved it is ***essential*** that sites within the conflict zone are assessed and discussed with relevant stakeholders.

- Check with the Local Planning Authority to determine whether the proposed pond creation scheme falls within the 13km conflict zone.
- Discuss the proposed scheme with stakeholders, including local airfield administrators with responsibility for birdstrike safety, local wildlife groups, landowners and the local planning authority.
- If there is significant risk, a case by case assessment of the pond creation scheme will be needed. This will include a survey to determine the level of risk before pond creation work begins. Local ornithological groups have considerable skill and experience of the necessary bird survey techniques.
- If the proposed scheme is thought likely to attract birds which pose a risk to aircraft then objections may be raised. As a result, more detailed planning and negotiation may be required. For further advice refer to Allan (2008) (see *Further reading* below).
- After pond creation, monitor the site to identify trends in bird numbers and if a problem arises be prepared to modify management plans to address any issues.

You may find that some individuals and local administrators object to the creation of small waterbodies without understanding that they will not pose a significant birdstrike risk. The Birdstrike Avoidance Team at the Central Science Laboratory, York (see *Useful contacts* below) can provide further expert advice to resolve disputes.

6. Useful Contacts

Birdstrike Avoidance Team, The Food and Environment Research Agency www.fera.defra.gov.uk - FERA has a team of expert specialists with unrivalled experience in bird hazard management that is able to offer a comprehensive range of services designed to help reduce the birdstrike risk for airports and airlines.

Civil Aviation Authority www.caa.co.uk – The UK's specialist aviation authority, with information and advice on UK birdstrike risk.

International Birdstrike Committee www.int-birdstrike.org – a voluntary association of representatives from organisations who aim to improve commercial, military, and private aviation flight safety.

RSPB www.rspb.org.uk – The UK's bird conservation charity. Their website includes useful case studies of wetland creation and managing birdstrike risk.

Wetland Vision www.wetlandvision.org.uk – a partnership project to secure the future of England's wetland landscape. Includes a report by the Birdstrike Avoidance Team to reduce the risk of birdstrike following wetland creation www.wetlandvision.org.uk/userfiles/File/Annex3_Airports%20and%20WetlandsOverview.pdf.

7. Further reading

Airports Council International (ACI) (2005) Aerodrome Bird Hazard Prevention and Wildlife Management Handbook, 1st Edition.

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Rochard, JBA. and Horton, N. (1980) Birds killed by aircraft in the United Kingdom 1966-1976. Bird Study 27: 227-234.

For further information about the Million Ponds Project and to consult other factsheets in the Pond Creation Toolkit, please visit *www. pondconservation.org.uk/millionponds* or email enquiries to *info@pondconservation.org.uk*

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