

AIRPORT OPERATORS ASSOCIATION
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SAFEGUARDING OF AERODROMES

Advice Note 6

Potential Bird Hazards from Sustainable Urban Drainage Schemes (SUDS)

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. An overview of the Safeguarding process is given in the first Advice Note in this series. The aim of this Advice Note is to briefly review the various broad types of Sustainable Urban Drainage Schemes (SUDS) techniques and to identify those that are likely to give cause for concern, or attract an objection, if proposed near an aerodrome.

SUDS are increasingly used to attenuate water flows for flood alleviation purposes and to treat contaminated water prior to discharge into watercourses. Government agencies and local planning authorities frequently require SUDS to be incorporated into designs for buildings, housing estates etc. including those near to aerodromes. Unfortunately, some SUDS designs have the potential to attract birds to the local area. Birds, especially large flocking species, can constitute a significant hazard to aircraft.

This information in this Advice Note is provided as a guide only and the particular circumstances surrounding individual developments (e.g. the precise location relative to the aerodrome, the numbers, behaviour and location of bird populations in the area, and the location of other bird attractive features in the local environment) will influence the final assessment of the level of risk likely to arise. Specialists in birdstrike prevention and aerodrome safeguarding should be consulted if there is any doubt as to the suitability of a particular technique for inclusion in a SUDS design near an aerodrome. This should allow unsuitable proposals to be identified at an early stage and either replaced with more appropriate designs or allow suitable mitigation methods to be identified that will allow the proposal to proceed with adequate safety margins.

2. SUDS Techniques

There are a number of recognised SUDS techniques, including: - green roofs and rainwater re-use, permeable pavements, infiltration trenches, filter drains, swales, basins, and ponds and wetlands. The following sections describe the likely bird attractions arising from each technique, the probability that an aerodrome might object to its use, and possible mitigation measures that could be used to manage the bird attraction.

a) Green Roofs And Rainwater Re-Use

Green roofs can improve water quality and reduce the peak flow and the total volume discharged from a roof. In addition, they can enhance insulation and increase the lifespan of the roof. Rainwater reuse (or harvesting) involves the collection and storage of rainwater on site and its use as a substitute for mains water, for example in watering gardens or for flushing toilets.

Green roofs are probably the least well understood SUDS technique in terms of bird hazard. Although there are relatively few green roofs near aerodromes in the UK they have been used more extensively elsewhere (e.g. near Frankfurt Airport), where no serious problems have been reported. In some parts of the UK problems are increasingly being encountered with birds, especially gulls, nesting on flat roofs. As well as birdstrike risk, issues such as blockage of drains, fouling of stonework, noise nuisance and aggression towards the public have all been cited as problems arising from roof nesting gulls. These birds are now increasingly moving inland, away from traditional coastal sites. A number of aerodromes are already encountering problems arising from colonies of roof nesting birds. At present these birds are nesting on the roof material itself, often placing their nests against chimneys, parapets etc., presumably to secure the nest structure against high winds. In the wild, gulls nest on cliff ledges or short turf on cliff-tops and islands. The provision of a short turf or other plant cover on a rooftop that would allow gulls to establish a secure base for a nest might encourage more birds to nest on that roof in preference to others nearby. There is insufficient information available at present to determine if green roofs do actually attract roof nesting birds, probably because such roofs have yet to be established in areas where roof nesting is common.

Because of the uncertainties surrounding green roofs their use close to aerodromes should be avoided, especially where roof nesting by gulls or other hazardous birds already occurs. At other sites, a roof design that allows easy human access, coupled with a management agreement to prevent nesting by hazardous species should be employed. Further research on the use of green roofs as nesting sites by species such as gull is needed.

b) Permeable Pavements

The need for surface water drains and off-site sewers can be reduced or eliminated where run-off is encouraged to permeate through a porous pavement, such as permeable concrete blocks, crushed stone or porous asphalt. Depending on the ground conditions, the water may infiltrate directly into the subsoil or be stored in an underground reservoir (for example, a crushed stone layer) before slowly soaking into the ground. If infiltration is not possible or appropriate (for example, because of ground contamination), an impermeable membrane can be used with an overflow to keep the pavement free from water in all conditions. Pollutant removal occurs either within the surfacing or sub-base material itself, or by the filtering action of the reservoir or subsoil.

Permeable pavements offer little to birds in terms of food water or shelter. Indeed, their use in place of impermeable surfaces may be beneficial in that it prevents the formation of puddles that may attract birds to drink or bathe. Permeable pavements present no problems for birdstrike management and their use can safely be encouraged around aerodromes.

c) Infiltration Trenches

An infiltration trench is a shallow, excavated trench that has been filled with stone to create an underground reservoir. Storm-water entering the trench is gradually infiltrated into the ground. Their longevity can be enhanced by providing pre-treatment of the storm-water using a filter strip, gully or sump pit to remove excessive solids.

Like permeable pavements, infiltration trenches offer little attraction to birds and can safely be used in developments near aerodromes.

d) Filter Drains

Filter drains are widely used by highway authorities for draining roads. Storm-water entering the trench is gradually infiltrated into the ground. Their longevity can be enhanced by providing pre-treatment of the storm-water using a filter strip, gully or sump pit to remove excessive solids.

Filter drains are similar to infiltration trenches and can safely be used for highway drainage near aerodromes.

e) Swales

Swales are grassed depressions which lead surface water overland from the drained surface to a storage or discharge system, typically using the green space of a roadside margin. They may be used to replace conventional roadside kerbs, saving construction and maintenance costs. Compared to a conventional ditch, a swale is shallow and relatively wide, providing temporary storage, conveyance, treatment and the possibility of infiltration under suitable conditions.

The attraction that swales provide to birds depends upon their size, the frequency and duration that standing water is present within them, and the type of vegetative cover that is established. Very large swales may attract birds to feed on the grassed area irrespective of the frequency with which they carry exposed water. Those that remain wet enough to support wetland vegetation, amphibians or invertebrates will offer a feeding site and possibly nesting cover for some hazardous bird species. Swales with overgrown vegetation will also provide nesting and roosting cover for birds. In general, small roadside swales that drain quickly and are maintained as short grass offer limited attraction to birds. They would be unlikely to attract an objection if proposed near an aerodrome unless they were very close to an aerodrome perimeter, when infiltration trenches or filter drains would be a preferable solution.

f) Basins

A basin is designed to hold back storm runoff for a few hours and to allow the settlement of solids. They are dry outside of storm periods. They provide temporary storage for storm water, reduce peak flows to receiving waters, facilitate the filtration of pollutants (deposited and incorporated into the substrate) and encourage microbial decomposition, as well as allowing water infiltration directly into the ground.

As with swales, the attraction that basins offer to birds depends on their size, frequency of flooding and vegetation cover. Because basins may be large in size and temporarily carry deep water, they may be fenced to prevent public access. Such sites may be seen as an opportunity to establish vegetation that enhances biodiversity objectives or that screen the basin from public view. Unless very carefully selected, such vegetation is highly likely to attract hazardous birds, and proposals of this nature will probably attract objections if located close to aerodromes. Basins can, however, be effectively designed to exclude hazardous birds. Bird exclusion netting can be used to keep larger species out of the basin whilst allowing smaller birds, insects, amphibians, etc. access. Issues of maintenance of the net, snow loading and public health and safety all need to be considered. An alternative solution is the use of 20cm diameter plastic spheres, marketed as 'Bird Balls'. These are tipped into the basin and float on the surface of the water when the basin is flooded thus denying birds access. Bird Balls have been used successfully at a number of aerodrome installations but they

prevent light penetration to the water and may reduce oxygenation at the surface. They are also not particularly visually attractive. Bird Balls may be particularly useful in managing contaminated water run-off from car parks, aerodrome runways etc. where the flow can be controlled in the basin prior to discharge into other treatment systems.

g) Ponds And Wetlands

Ponds or wetlands can be designed to accommodate considerable variations in water levels during storms, thereby enhancing flood- silt and preventing clogging of the outlet. Removal of collected sediment from the inlet sump may be needed, although typically this is unlikely to be more than once every seven years.

Ponds and wetlands are the SUDS options most likely to attract objections if proposed within the 13km aerodrome safeguarding circle. Permanent wetlands attract a variety of hazardous birds such as waterfowl, gulls, herons etc, and any surrounding trees may attract corvids pigeons or Starlings. Birds moving from one wetland site to another may cross aircraft flight paths and thus create a birdstrike risk. Even if a wetland or pond is proofed to prevent bird access, birds will continue to visit the site to check if feeding or other resources are available and then move on to another wetland when they find that they cannot reach the water. When considering whether to object to a planning application involving ponds or wetlands, an aerodrome manager or his/her advisors, need to consider a variety of factors, such as the size of the proposed wetland, its detailed design in terms of bank profiles, water depth, proposed vegetative cover, any future management plans, its location in relation to aircraft flight paths and similar habitats nearby, and any proposed mitigation measures to control the birdstrike risk that are proposed. Changes to one or more of these factors may help to reduce the birdstrike risk to an acceptable level. One example of such mitigation would be the development of a dense vegetative cover, to remove the visual attractant and hinder access, such as closed reedbed or the development of carr woodland. However, the suitability of such mitigation will depend on the unique set of circumstances that prevail at an individual site.

Therefore, the best option is to eliminate ponds and wetlands from SUDS designs near aerodromes whenever possible. Where they are essential then early consultation with the aerodrome is highly recommended.

Further guidance on bird hazards associated with water bodies and their mitigation is contained in Civil Aviation Publication CAP680 Aerodrome Bird Control, particularly Part 4 Chapter 30 (available on the CAA website <www.caa.co.uk/publications>).

In addition further information is available on the bird hazards associated with landscaping or building design and landfill sites in other advice notes in this series, **Advice Note 3 – Potential Bird Hazards from Amenity Landscaping and Building Design** and **Advice Note 5 – Potential Bird Hazards from Landfill Sites**.

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Advice Note 1: Safeguarding - An Overview

Advice Note 2: Lighting near Aerodromes

Advice Note 3: Potential Bird Hazards from Amenity Landscaping and Building Design

Advice Note 4: Cranes and Other Construction Issues

Advice Note 5: Potential Bird Hazards from Landfill Sites

Advice Note 7: Wind Turbines and Aviation