Low-Impact Development. In recent years, Riverside County has focused on Low-Impact Development (LID), which includes techniques to filter, store and retain runoff on-site. LID BMPs retain runoff to optimize infiltration/recharge, and many promote the use of vegetation to provide for the uptake of pollutants. Although LID BMPs can provide environmental, economic and community benefits, they can retain open water for prolonged periods and attract hazardous wildlife. Many LID BMPs are incompatible with aircraft operations and must be considered with caution within the AIA.

Aviation-Specific Stormwater Management. FAA acknowledges that project-related BMPs must consider many non-aviation factors, such as soil types, space requirements, maintenance, constructability, etc. United States Department of Agriculture (USDA) and FAA have identified specific design characteristics that should be considered during BMP design and incorporated to make most BMPs less attractive to wildlife (**Table 2**).

ADAPTIVE MEASURES

When open water detention ponds must be used within the AIA, the ponds may be equipped with bird balls, floating covers, nets, or overhead wires to cover open water and discourage use by hazardous wildlife. For example, concrete basins are unlikely to attract wildlife, and pond liners can prevent the development of hydrophytic vegetation. These technologies must be used with caution and only in areas with controlled access.

Infiltration trenches detain water for brief periods. This trench at Seattle-Tacoma Airport includes vegetation appropriate for an airport environment.

Bioretention facilities can provide food and shelter for potentially hazardous wildlife, but may be suitable with modification.

Table 1. Structural Best Management Practices (BMPs) and Compatibility in an Airport Influence Area (AIA)

BMP	Compatibility within the AIA
Infiltration trenches Recommended	■ Suitable because water accumulates below ground surface. ■ Vegetation must be selected and reviewed by a FAA-qualified Airport Wildlife Hazard Biologist (qualified biologist) to discourage wildlife.
Permeable Pavement Recommended	Does not include water storage. Appropriate for parking lots and other paved surfaces that are not high-traffic areas.
Harvest and Use (RWH) Recommended	Suitable as long as water is stored in enclosed areas.
Sand Filter Basins Recommended	Desirable because standing water is treated through an underdrain system.
Vegetated Filter Strips and Vegetated Swales Recommended	Desirable because neither BMP involves ponded water. However, vegetation must be selected to discourage hazardous wildlife and reviewed by a qualified biologist.
Water Quality Inlets Recommended	Desirable because they do not provide ponded water. Associated vegetation must be selected to discourage hazardous wildlife and reviewed by a qualified biologist.
Infiltration Basins Not recommended without Modification. Suitable only if design addresses wildlife hazards	■ Unsuitable in ALUCP Compatibility Zone A. ■ Suitable in Zones B and C with appropriate modifications, such as: Drawdown within 48 hours or manufactured cover to prevent view and availability of open water; and absence of landscape or landscaping approved by a qualified biologist. ■ Steep slopes (steeper than 3:1).
Bioretention Facilities Not Recommended without Modification (also known as rain gardens bioretention basins, infiltration basins, landscaped filter basins)	Although bioretention can mask open water, BMP is not recommended for airports based on its potential to provide food, water, and shelter for hazardous wildlife. ■ Unsuitable in Compatibility Zone A. ■ Potentially suitable in Zones B and C only when small in size (e.g., parking islands, site entrances, planter boxes, etc.) and when vegetation is selected to discourage hazardous wildlife and reviewed by a qualified biologist. ■ Potentially suitable in Zones D and E when basin is less than 30 feet in length/width; and vegetation is selected to discourage hazardous wildlife and reviewed by a qualified biologist.
Extended Detention Basin Not Recommended	■ Unsuitable in Zones A through C. ■ Should be avoided in Zones D and E. If necessary, modify detention period to provide no visible water within 48 hours, provide steep slopes (1:1), provide hardscape for walls and sides; and do not provide vegetation within or adjacent to the pond.

Small bioretention facilities that provide sparse vegetation may be suitable in an aviation environment.

Extended detention basins are frequently used to serve both water quality management and to provide amenities. These basins hold water and would not be appropriate within an AIA because of the open water.

Sand filter at the base of the bioswale promotes infiltration.

Porous pavements allow water to infiltrate to a soil layer below the surface.

Adaptive measures such as liners, a concrete basin, and overhead wire grid can make extended detention strategies less attractive to hazardous wildlife.

Infiltration basins with rock bottoms are less attractive to birds because they mask water and do not provide vegetation.

Vegetated bioswales improve water quality and prevent water accumulation. However, dense and tall vegetation may be attractive to hazardous wildlife.

STORMWATER BEST MANAGEMENT PRACTICES

Riverside County and its incorporated cities require water quality/stormwater management controls for development and redevelopment projects. The Riverside Conservation District has prepared a separate Water Quality Management Plan for each watershed in the County that identifies treatment control Best Management Practices (BMPs) for improving water quality and managing stormwater volumes/flows following the design storm (i.e., 24-hour storm). Structural BMPs identified in Riverside County guidance and their compatibility within the AIA are summarized in **Table 1**.

ADDITIONAL RESOURCES/MORE INFORMATION:

- Riverside County Flood Control and Water Conservation District, Water Quality Management Webpage. Available at: http://rcflood.org/npdes.

- FAA Advisory Circular 150/5200-33, "Wildlife Hazard Attractants On and Near Airports": https://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf.

- Airport Cooperative Research Program, Balancing Airport Stormwater and Bird Hazard Management: https://www.nap.edu/login.php?action=guest&record_id=22216.

Table 2. Recommended Measures to Reduce Wildlife Attraction Associated with Stormwater BMPs

BMP Characteristic	Recommended Design Measure
Exposed Surface Water • Especially attractive to waterfowl, shorebirds, and flocking birds. • Provides source for drinking and nest building. • More attractive when constructed near other open water features or ponds.	• Reduce availability by providing 48-hour drawdown following a design storm (i.e., 24-hour storm). • Cover using bird balls. • Consider earth-bottom culverts, French drains, trench covers, and underground storage options. • Avoid within 8 km (5 miles) of other open water features or facilities.
Vegetation and Landscaping • Provides food. • Tall vegetation provides shelter and nesting opportunities. • Diverse vegetation attracts more diverse wildlife.	• Eliminate vegetation (concrete banks, steep slopes, etc.). • If necessary, provide a monoculture or decreased diversity. • Never use species that provide a food source (seeds, berries, nuts, and drupes). • Provide regular maintenance to prevent seeding and shelter.
Aspect/Geometry • Slopes can provide opportunities for nesting and loafing.	**Avoid or reduce available shoreline:** • Implement narrow, linear trenches rather than open water or regular circles as pond shapes. • Create steep slopes (<3:1). • Avoid irregular shapes for basins. • Avoid vegetation.

WHAT YOU CAN DO:

Airport operators, developers and communities must work together to manage stormwater in the airport vicinity to reduce hazards to air travelers and the public while addressing site-specific challenges.

- Identify whether your project is near an airport and in an AIA or critical area. (http://www.rcaluc.org/Plans/New-Compatibility-Plan).

- Work with the airport operator, ALUC, and city/county staff to identify an acceptable water quality management strategy.

- Contact the applicable airport to review your stormwater plans or request plan review by a FAA-qualified wildlife biologist. The form is available at: http://www.rcaluc.org/Portals/0/PDFGeneral/form/Wildlife%20Attractants%20-%20FAA%20Review.pdf.

AIRPORTS, WILDLIFE AND STORMWATER MANAGEMENT

GUIDANCE FOR PROPOSED PROJECTS IN AN AIRPORT INFLUENCE AREA

Riverside County includes diverse topography and is home to three watersheds and a portion of the Salton Sea, an important stop along the Pacific Flyway for migrating bird species. The County's arid climate makes water quality management and water conservation paramount.

The County is also the home to Palm Springs International Airport, 12 public use general aviation airports, and the March Air Reserve Base, whose operations can be challenged by the presence of hazardous wildlife such as raptors, water-fowl, doves/pigeons, gulls, flocking birds, and mammals (coyote and deer). Since 1990, more than 150 wildlife strikes with aircraft have occurred in Riverside County, some of which have led to substantial aircraft damage. Most strikes occur at low altitude (less than 3,500 feet above runway height). Much of the geographic area associated with these altitudes coincides with an Airport Influence Area (AIA) as defined in the Riverside County Airport Land Use Compatibility Plan (ALUCP).

AIRPORTS, WILDLIFE AND STORMWATER MANAGEMENT

The Federal Aviation Administration (FAA) identifies stormwater management facilities on and near airports as one of the greatest attractants to hazardous wildlife. Many species are attracted to open water features and associated vegetation that offers water, food, and shelter. The FAA warns against the construction of new open water bodies or mitigation sites within 10,000 feet of aircraft movement areas and within 5 miles of approach/departure surfaces (FAA Advisory Circular 150/5200-33B).

Remains of an owl ingested by an aircraft engine.

Riverside County
Airport Land Use Commission