Chapter 2. Airport Operations and Stormwater

This chapter contains stormwater planning and design information specific to airports.

- Section 2-1 describes airport operations zones and FAA restrictions within each zone, especially as they potentially affect stormwater management.
- Section 2-2 describes general considerations and principles that should be evaluated when siting proposed stormwater facilities.

2-1. Airport Operation Zones and Restrictions

In the 150/5200-33 series of Advisory Circulars, the FAA (2004a) identified three airport operation zones, known as Perimeters A through C, relating to stormwater facilities and other potential hazardous wildlife attractants near air operations areas. For certificated airports, airport operators are required to adhere to the intent of the guidelines in the FAA Advisory Circulars. For surrounding municipalities and jurisdictions outside of the airport grounds that fall within Perimeters A through C, restrictions associated with each zone are considered recommended guidelines.

In addition, local, state, or federal agencies may have more stringent requirements for specific land uses. In those cases, those regulations must also be followed.

2-1.1. Description of Airport Operation Zones and Guidelines

Perimeter A applies to airports serving piston-powered aircraft. No hazardous wildlife attractants should be located within this perimeter, which is defined as 5,000 feet from the nearest Air Operations Areas (AOA). An AOA is defined as any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. This includes such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to associated runways, taxiways, or aprons.

Perimeter B applies to airports serving turbine-powered aircraft. No hazardous wildlife attractants should be located within this perimeter, which is defined as 10,000 feet from the nearest AOA.

Perimeter C applies to all airports, regardless of the types of aircraft served. If possible, hazardous wildlife attractants that could cause wildlife movement into or across the approach or departure airspace should not be located within this perimeter, which is defined as 5 statute miles from the nearest AOA.

These perimeters are described in this section because, for certificated airports, airport operators are required to adhere to the intent of the guidelines in Advisory Circulars, and to alert airport
operators to the fact that land uses outside of the airport could present aircraft hazards by attracting wildlife. In many cases, wildlife attractants within Perimeter C consist of existing natural features. Where possible, airport facility planning should take into consideration the existing natural features within Perimeter A (e.g., avoid locating critical AOA facilities within or between habitat features where birds are likely to fly).

Airport operators are strongly encouraged to engage a wildlife specialist on any significant proposed projects within Perimeters A, B or C early in the conceptual or preliminary design phase to ensure that hazardous wildlife considerations are incorporated at an early stage. Refer to Chapter 3 for more information on stormwater and wildlife planning considerations.

Restrictions on Off-Airport Land

If a local jurisdiction owns an airport and adjacent land within Perimeter C, the jurisdiction would be obligated to meet the Perimeter C restrictions for that adjacent land.

When land within Perimeter C is owned by other entities (who have no affiliation with the airport), airport operators should also work with and educate landowners within Perimeter C regarding stormwater management practices that will not present risks to aircraft. These landowners are not obligated to meet the FAA restrictions although their cooperation is encouraged.

The Perimeter A, B, and C restrictions also apply to off-airport land that is owned by certificated airports, which is common for industrial land in the vicinity of airports.

Regardless of ownership of the land adjacent to or in the vicinity of airports, airport managers should be aware of all proposed development within Perimeter C. Airport managers are encouraged to take a proactive approach with project proponents, make sure that they are aware of hazardous wildlife concerns, and encourage design measures that are compatible with the airport environment.

Airspace Restrictions

In addition to the Perimeter A, B, and C regulations/recommendations, the FAA Northwest Mountain Region, Part 77 regulations (airspace restrictions) usually apply. The Seattle Airport Districts Office (ADO) has recommended that a form 7460 be completed when detention ponds are proposed to be located within the set limits of airports if the ponds are not covered with netting, balls, or a floating cover to discourage wildlife use. The rationale is that attractants can result in potential airspace conflicts with wildlife. Design methods proposed in this manual will greatly reduce the attractiveness of stormwater detention facilities, reducing the area that must be covered with netting, balls, or floating covers.

The FAA also has formal operational zones with restrictions and requirements that must be followed. These operational zones are listed in Section 2-1.2.
The BMP descriptions and design guidelines in Chapter 6 refer to airside and landside locations at airports. For the purposes of this manual, these terms are defined as follows:

- **Airside** refers to all areas where aircraft are operated or serviced. These include the AOA, which is described above, as well as airport areas where maintenance, refueling, storage, and other support activities for aircraft are conducted.

- **Landside** refers to all other areas of the airport (e.g., parking areas, rental car lots, arrival and departure pickup/dropoff roadways, and terminals).

### 2-1.2. Stormwater Facility Restrictions

The FAA formally defines several operational areas with specific delineation criteria and requirements that must be considered when designing airport stormwater facilities. Dimensions of these areas vary depending on the specific airport environment. Delineation guidelines, while beyond the scope of this document, are found in the *Airport Design Advisory Circular 150/5300-13* (FAA 2006b).

The FAA defines the following areas of significance to designers of stormwater facilities. Each area is also illustrated in Figure 2-1:

- **Clearway (CWY):** A defined rectangular area beyond the end of a runway cleared or suitable for use in lieu of runway to satisfy takeoff distance requirements. This is the region of space above an inclined plane that leaves the ground at the end of the runway. FAA design standards state that the ground area underneath the clearway need not be suitable for stopping aircraft in the event of an aborted takeoff. Because of this standard, it is acceptable to place stormwater BMPs on the ground under the clearway as long as objects associated with the BMPs do not protrude through the clearway plane.

- **Object-Free Area (OFA):** An area on the ground centered on a runway, taxiway, or taxi lane centerline. It is provided to enhance the safety of aircraft operations by having the area free of aboveground objects protruding above the Runway Safety Area (RSA, defined below) edge elevation, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. Per FAA design standards, restricted objects include but are not limited to the following: aboveground structures, navigational aids, people, equipment, vehicles, natural growth, terrain, parked aircraft, and agricultural operations. OFA design guidelines limit the types of stormwater BMPs that may be located within the OFA. Stormwater BMPs within the OFA must not include objects that protrude above the RSA edge elevation.
Runway Protection Zone (RPZ): An area off the runway end that enhances the protection of people and property. According to the FAA Advisory Circular, Hazardous Wildlife Attractants On or Near Airports, stormwater facilities are permitted within the RPZ, provided they do not attract wildlife and are located outside of the runway OFA. They may not interfere with navigational aids (FAA 2006a).

Runway Safety Area (RSA): A defined ground surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway. FAA design standards require that the RSA be:

- Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations.
- Drained by grading or storm sewers to prevent water accumulation.
- Capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- Free of objects, except for objects that need to be located in the RSA because of their function. Objects higher than 3 inches above grade should be constructed, to the extent practicable, on low-impact, resistant supports of the lowest practical height with the frangible (i.e., fragile or easily broken) point no higher than 3 inches above grade. Other objects, such as manhole covers, should be constructed at grade. In no case should their height exceed 3 inches above grade.

These RSA design standards have direct implications for the design and location of stormwater facilities. In most cases, stormwater BMPs must be located outside of the RSA unless they are subsurface facilities and can be driven over without damage to vehicles, aircraft, or the stormwater system. Any manholes within the RSA must be constructed flush with existing grade. Unlike some airport design standards, RSA standards cannot be modified or waived.

The FAA also recommends that the entire RSA be accessible to rescue and firefighting vehicles so that no part of the RSA is more than 330 feet from either an all-weather road or a paved operational surface. Components of the stormwater management system within the RSA should accommodate this.

Stopway (SWY): A defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of the runway to support an aircraft without causing structural damage to the aircraft during an aborted
2. No surface variations or water accumulation within RSA (AC 150/5300-13 CHG7/305).
3. Manhole covers shall be constructed at or near surface grade elevation (max. protrusion 3" above grade) within RSA.
4. All areas within RSA must be capable of supporting snow removal, aircraft, and emergency vehicles.
5. No objects non-essential for air navigation or aircraft ground maneuvering permitted in OFA.
6. Stormwater facilities are permitted within RPZ (outside of OFA). Facilities must not attract wildlife or interfere with navigational aids.
7. If a Stopway is provided, it must be able to support an airplane during an aborted takeoff without causing structural damage to the airplane.
8. The Clearway slopes upward (from end of Runway) at a maximum slope of 1.25%.
9. No object or terrain (except threshold lights) may protrude through the Clearway plane.
takeoff. If stormwater BMPs are located within the SWY, they need to be subsurface and capable of supporting aircraft in the case of an aborted takeoff.

- **Taxiway Safety Area (TSA):** A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft unintentionally departing the taxiway. FAA design standards for TSAs are the same as those for RSAs and have direct implications for the design and location of stormwater facilities. In most cases, stormwater BMPs must be located outside of the TSA unless they are constructed subsurface and can be driven over without damage to vehicles, aircraft, or the stormwater system. Any manholes within the TSA must be constructed flush with the existing grade. Like the RSA standards, TSA standards cannot be modified or waived.

2-2. **General Airport Stormwater Considerations**

2-2.1. **Safety and Emergency Access**

Safety is of primary importance at airports and must be considered first while developing stormwater management facilities. In the event of a problematic landing, emergency vehicles and personnel may need to access certain parts of the airport. The location and configuration of stormwater facilities must not impede the operation of emergency vehicles.

2-2.2. **Maintenance**

Stormwater facilities must be maintained periodically to remove accumulated sediment deposits, trim vegetation, or clean filters and trash racks. Stormwater facilities that require routine maintenance should not be located in areas where the maintenance activities would hinder or disrupt airport operations. For example, a location within an OFA would not be suitable for a filtration system requiring frequent trips by personnel and equipment for maintenance during airport operational hours. Instead, stormwater could be piped to the filtration system outside the OFA.

2-2.3. **Target Pollutants**

The manuals and permit documents identified in Sections 1-3.3 and 1-3.4 of this manual should be consulted to determine levels of treatment and pollutants of concern.

2-2.4. **Community Planning**

If an airport is located within or adjacent to a community that may be installing stormwater management facilities, the airport operators may want to encourage nearby communities to use
this manual for BMP design considerations and guidelines. At a minimum, airport operators should discourage the implementation of stormwater BMPs that are known wildlife attractants within the airport’s operation zones. This is similar to coordination that airports already do with local jurisdictions to discourage the siting of landfills, food processors, certain agricultural operations, or other hazardous wildlife attractants in locations where they could potentially affect air operations. If communities are interested in providing wildlife habitat along with stormwater management, airport operators are encouraged to help neighboring communities identify high-value habitat areas for mitigation that will benefit wildlife without posing unacceptable risks to humans, wildlife, and aircraft.