

# Minimizing Pond Size at a Growing Airport

## Up-Flo® Filter Achieves Balance Between Stormwater Regulations and FAA Requirements

### Project Profile

#### Objective

A growing airport needed to increase their stormwater treatment capacity but FAA regulations constrain the use of wet ponds due to the potential safety hazard that birds pose to air traffic.

#### Solution

A Hydro International Up-Flo® Filter was installed upstream of the existing stormwater pond to provide the additional level of treatment required by the new construction.

### Product Profile

- High rate upflow filtration translates to a smaller footprint and lower capital cost than other proprietary stormwater filters
- Low headloss and hydraulic drop allow for easier fit into the existing drainage profile
- Maintenance requires no heavy lifting equipment, resulting in a lower cost of ownership for Dane County Regional Airport

Find more about the Up-Flo® Filter at [www.hydro-int.com](http://www.hydro-int.com)

DANE COUNTY, Wisconsin - Dane County Regional Airport is a joint civil-military commercial airport serving the Madison area in south-central Wisconsin (Fig.1). It is the second largest airport in the state, with more than 100 daily flights and more than 1.6 million passengers passing through each year.

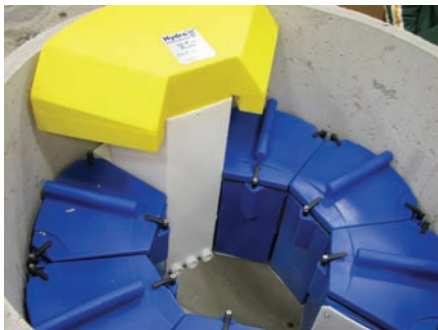


Fig.1 Dane County Regional Airport has undertaken multiple initiatives to expand and upgrade its facilities in recent years.

In recent years, the airport has undertaken a series of construction projects, adding new runways, parking facilities, airport ramps and office space. One of these projects involved rebuilding an access road around the airport and resurfacing 5.3 acres of parking lots. To meet State stormwater regulations for this development, airport officials were charged with upgrading their stormwater management system.

Ideally the airport would have expanded their existing pond. However, the location of the pond in relation to the runways could have created a problem by attracting large water birds that posed a danger to aircraft. FAA regulations do not allow ponds that retain water for more than 48 hours on airport sites.

To comply with this requirement, Dane County airport officials could not modify the existing stormwater pond which stayed dry except during heavy rain events. At the same time, they needed a BMP that could meet the Wisconsin Department of Natural Resource's (DNR) goal of treating 40 percent of the Total Suspended Solids (TSS) generated by runoff from impervious surfaces without creating any standing water. Additionally, there was limited space and existing drainage infrastructure that could not be abandoned. After evaluating different conventional BMPs based on land take and ability to fit into the existing drainage system and wet pond, proprietary treatment systems were considered to be the most practical BMP.



The Airport and its consulting engineer on the project, GRAEF, reviewed several filtration systems before choosing the Up-Flo® Filter from Hydro International (Fig.2).

The Up-Flo® Filter is an efficient high-rate stormwater filtration system that removes trash, sediment, nutrients, metals and hydrocarbons from stormwater runoff. Using the industry's only fluidized bed filtration technology, the Up-Flo® Filter is able to utilize the entire depth of media and offer longer life of filter media and a longer maintenance cycle than conventional downward flow sand and cartridge type systems.

Fig.2 The Up-Flo® Filter has a higher flow through capacity than traditional sand filters, making it a smaller, more economical solution for stormwater treatment.

GRAEF initially chose the Up-Flo® Filter based on cost per filtered flow rate. However, additional benefits of Up-Flo® quickly became clear. It was the only filtration product that could operate with a 12-inch drop between inlet and outlet and filter more than 100 gpm with only 20 inches of driving head, on an overall water elevation difference of about 2.5 feet. Prior to the site's improvements, the runoff discharged into a small settling pond. This pond discharges into Starkweather Creek, which feeds into Lake Monona near downtown Madison.

The initial concept was to retrofit the existing outlet in the pond with a Hydro-Brake®

**“The pond and adjacent storm sewer emptying in Starkweather Creek are free of sediment, and to this date the maintenance has been very minimal.”**

Ed Premo, Construction Engineer  
GRAEF

Optimum flow control, which would allow the pond to accommodate the increased runoff volume caused by proposed changes to the site's impervious area. In this case, the pond's controlled outflow discharge would have been filtered by the Up-Flo® Filter.

To minimize construction costs and fully take advantage of the Up-Flo® Filter unit's intended use for source control, construction engineer Ed Premo at GRAEF, moved the Up-Flo® Filter upstream of the existing pond (Fig.3) so that it intercepted the majority of the most frequently occurring runoff.

An existing catch basin was modified to divert over 50% of the annual runoff to the Up-Flo® Filter prior to overflowing into the pond. The pond was used for detention and treatment of the more infrequent overflows essentially providing a polishing stage. This kept the majority of the pollutant load in the Up-Flo® Filter and significantly reduced the maintenance needs of the pond.

The Wisconsin DNR requires treatment options to be modeled in WinSLAMM, a Source Loading and Management software program. Using real rainfall data from Madison Airport, WinSLAMM was used to generate probability distributions of flows that were expected from the 5.3 acre site.

Performance data of the Up-Flo® Filter was applied to the rainfall analysis and runoff distribution curves to demonstrate compliance with the State's goal of 40% TSS reduction. Performance characteristics of the Up-Flo Filter are expected to be coded into the next release of WinSLAMM which will enable engineers to model the load reductions as they do with other non-proprietary treatment systems.

Ed Premo, GRAEF's construction engineer, said the installation went smoothly, with workers unloading the Up-Flo® Filter and installing it in one day.

Premo has been visually monitoring the installation for about a year now and commented recently that the unit is working well. He commented to Hydro International in a follow-up conversation that the structure downstream of the filter looks just like it did the day they installed it.

He added, “The device chosen was the most economical option and solved an issue that the Wisconsin DNR had with the additional parking areas the airport had planned for the desired growth of business. The pond and adjacent storm sewer emptying in Starkweather Creek are free of sediment, and to this date the maintenance has been very minimal” (Fig.4, 5).



Fig.3 FAA regulations prevented installing a larger pond because it would have attracted waterfowl; a hazard to aircraft. The filter allowed the airport to continue relying on its small detention pond.



Fig.4 Easy-to-Change Filter Media Bags Make Maintenance Simple and Affordable.

Hydro worked with a local contractor, The Drainage Doctor, and the Dane County Airport to carry out maintenance on the filter. The filter is easy to maintain. Confined space-trained personnel with a standard vector truck can clean the sump and change the filter bags in less than an hour. Unlike other systems, no cranes or heavy lift equipment are required to remove or install the bags.

The used filter bags, shown above, captured a significantly greater portion of their installed dry weight worth of pollutants. Notice the difference compared to a new media bag, shown in Fig.5 below.



Fig.5 A new Up-Flo® Filter media bag.

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