**Article 82**

*Technical Note #19 from Watershed Protection Techniques. 1(2): 72*

# Water Reuse Ponds Developed in Florida

Stormwater runoff can become a valuable water resource in many regions of the country. This novel perspective has led to the development of *water reuse ponds*. The basic principles are quite simple. Stormwater runoff is captured and stored in a pond, and then pumped back out to irrigate pervious areas in the contributing watershed. These areas can include golf courses, cemeteries, landscaping, community open space, and turf areas.

The design is similar in many respects to a wet extended detention (ED) pond. Each has four distinct storage components: sediment/forebay storage, flood control storage, pool storage, and temporary storage. The key difference is that in water reuse ponds, temporary storage is gradually pumped out for irrigation, whereas in wet ED ponds, it is gradually released downstream over a 24-hour period. During an extended dry weather period, continued pumping of the water reuse pond can draw down water levels in the permanent pool.

Water reuse ponds have several key environmental and economic benefits. The greatest benefit is the increased pollutant removal and groundwater recharge that occurs because a large fraction of the annual stormwater runoff volume (and pollutant load) are applied back to the watershed. Consequently, water reuse ponds are expected to achieve even greater mass pollutant removal rates than standard stormwater ponds. Without reuse, ponds cannot reduce the volume of runoff delivered downstream, and must rely exclusively on pollutant removal pathways within the pond to capture and treat stormwater pollutants.

Water reuse ponds are also a particularly useful design option where the water table is close to the land surface. Continuous pumping helps maintain storage capacity that would otherwise be lost due to groundwater intrusion.

The key economic benefit of water reuse ponds is that they are a relatively cheap source of irrigation water, when compared to the cost of potable water supplies. For example, Wanielista and Yousef (1993) calculate that the cost of irrigating a 100-acre, 18-hole golf course (two inches per week) may cost the operator nearly $300,000 a year if potable water is used. In contrast, the annual irrigation cost of pumped stormwater from a water reuse stormwater pond was seven times lower (about $40,000/year).

Two questions are often asked about water reuse ponds:

- How much stormwater storage is needed to assure a reliable irrigable water supply?
- How much stormwater runoff actually leaves the pond? Put another way, is it possible to design a "zero-discharge" pond?

To answer these questions, Wanielista and his colleagues simulated a water reuse pond in Florida using 15 years of daily rainfall, runoff, reuse, and pond discharge data. The heart of the model is a pond water balance that computes changes in incoming runoff, groundwater, direct rainfall to the pond, irrigation, pond outflow, storage, evapo-transpiration, and other hydrologic terms.

The model accurately simulated the actual performance of a monitored water reuse pond in Orlando, Florida. It was then used to construct a series of rate-efficiency-volume (REV) curves. These curves are a helpful aid in designing water reuse ponds. While REV curves are presently available only for Florida, the basic modeling approach is transferable to other regions of the country.

An analysis of the Florida curves suggest that water reuse ponds can provide a reliable source of irrigable water over the long term if a sizeable reuse volume is provided (often in excess of the local water quality volume). At this size, as much as 50 to 90% of the incoming runoff will be recycled back on the land, depending on the irrigation rate.

Water reuse ponds do have a few drawbacks. For example, they require a greater degree of operation than other stormwater practices, as well as the presence of a nearby customer for irrigation water. Also, reuse ponds may not be appropriate in sensitive streams, as continued pumping could diminish or eliminate downstream flows needed to sustain aquatic life. Nevertheless, they are a potentially useful pond design option in many climatic regions where irrigation is needed in urban areas on a seasonal or year-round basis. ***—TRS***

**Reference**

Wanielista, M. and Y. Yousef. 1993. "Design and Analysis of an Irrigation Pond Using Urban Stormwater Runoff." *Engineering Hydrology*. C. Kuo (ed.) ASCE. New York, NY. pp. 724-730.