

Wet Retention Ponds vs. Dry Detention Ponds

You might be asking yourself why this is even important to you. Well, enough board members asked after we ran our article in February to cause me to do a little more research on the subject. As it turns out, it is very important and there are considerable differences.

Wet Retention Ponds

A retention pond is a pond designed to hold a specific amount of water indefinitely. Usually the pond is designed to have drainage leading to another location when the water level gets above the pond capacity, but still maintains a certain capacity. Retention ponds capture the diverted storm water runoff from streets and gutters and other impervious surfaces, such as roofs, parking lots and sidewalks. Retention ponds provides two primary services. First, they retain runoff before releasing it into streams or other bodies of water. They release the water at flow rates and frequencies similar to those that existed under natural conditions (prior to land clearing and development). The flood volume held in a retaining pond reduces the impact on downstream storm water systems. The second benefit of retaining ponds is they provide pollutant removal through settling and biological uptake. (Biological uptake is the transfer of substances from the environment to plants, animals and humans.) Ponds remove 30-80% of certain pollutants from water before it enters other bodies of water or water sheds. (Water shed: an area of land that drains downslope to the lowest point. The water moves through a network of drainage pathways, both underground and on the surface - most commonly associated with lakes, riverfronts and streams.) Common pollutants reduced are sediments, bacteria, greases, oils, metals, total suspended solids, phosphorous, nitrogen and trash. Ponds are one of the most effective tools at providing channel protection and pollutant removal in urban streams. Essentially, retention ponds provide water quality and quantity control.

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Aquatic vegetation is often associated with wet ponds. Vegetation such as grasses and plants are able to establish themselves in the wet ponds thus providing extra pollution removal. The aquatic plants serve as an extra filter in the pond. They assimilate dissolved pollutants and by "biological uptake", transform pollutants into less toxic materials. Microorganisms often establish themselves in wet ponds and aid in the breakdown of pollutants.

Dry Detention Ponds

Dry ponds, also called "detention ponds" are storm water basins that are designed to intercept a volume of storm water runoff and temporarily impound the water for gradual release to the receiving stream or storm water sewer system. (Dry ponds are typically on-line, end-of-pipe BMP's (Best Management Practices)). Dry ponds are designed to completely empty out between runoff events and therefore provide mainly runoff rate control as opposed to water quality control. Dry ponds can provide limited settling of particulate matter, but a large portion of this material can be resuspended by subsequent runoff events. Therefore, dry ponds should be viewed as a way to reduce the peak discharge of storm water into receiving streams or storm water sewers to limit downstream flooding.

Most dry detention ponds are designed to empty in a time period of less than 24 hours, resulting in lower contaminant removal (the inter-event settling time does not exist) than wet ponds. If water quality treatment is the intended goal of the pond, a wet or extended storage pond design should be considered.

Traditional dry ponds have rarely been considered acceptable ponds from a water-quality perspective. The potential for scour (the removal of soil and bank material from rushing water) and small detention times almost always eliminates these ponds from consideration as a water quality BMP. Dry ponds are generally longer than they are wide. The grading in a dry pond is less critical than a wet pond since there is no permanent pool. The side slopes are generally an average of 3:1 or flatter. Flatter slopes help prevent erosion of the banks during larger storm events and make routine maintenance of the slopes (mowing) easier. They

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also provide for better public safety and allow easier access.

Dry ponds are normally the least affected by winter/spring conditions because there is no permanent pool and the pond's function is not dependent on infiltration.

Maintenance is required for the proper operation of dry ponds. Plans for dry ponds should identify owners or parties responsible for maintenance and an inspection and maintenance schedule for extended storage ponds. Once constructed, the dry pond should be inspected after several storm events to confirm drainage system functions, bank stability and vegetation growth. The outlet structure should be inspected for evidence of clogging or outflow release velocities that are greater than design flow. At least twice during the growing season, accumulated trash and debris should be removed from the side slopes, embankment and spillway. All dry pond outlet devices should be protected from clogging. Sediment should be removed from the pond as necessary and at least once every 5 to 25 years (usually sooner rather than later).

The frequency of sediment removal depends on the years of sediment accumulation that were incorporated into the design. Because these types of ponds do not have as much sediment storage volume as a typical wet pond, they need to be maintained more regularly.

Residential areas also pose an added threat to the storm water systems with such common activities as fertilizing and watering lawns, washing cars and painting houses. The simple act of water runoff from fertilization will increase the buildup of nutrients in a wet pond. A shallow basin and warm weather can create an algae bloom that will cause the pond to attain a green scum or large clumps of algae floating on the surface. This bloom can remove the oxygen from the water and kill off any fish or other aquatic inhabitants that are present, creating an unsightly and smelly mess.

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Grass clippings blown into the pond from mowers facing the wrong way can also create issues. Grass clippings being washed into the storm sewers contribute to problems with sediment and clogging of the pipes. Not only is it unsightly, but the decomposition of the material adds nutrients that can cause other problems.

Retention ponds are beneficial for providing storm water abatement and the removal of pollutants from storm water, whether dry or wet. Many states such as California, Nevada, Idaho, North Carolina and Florida realize the potential benefits of retention ponds. For example, the state of Florida began requiring storm water treatment in new developments in the 1980's. New developments are required to reduce pollution associated with storm water runoff. Thousands of ponds have been designed and built to help meet this need.

Retention ponds are ideal partners for residential areas within proximity to any river, stream or watershed since the pollutant most successfully removed from the storm water is sediment.