

# Wet Pond



## Description

A wet pond is a constructed pond that maintains a permanent pool of water. Pollutant removal comes primarily by way of sedimentation, and solids, metals, nutrients in particulate form and organics are the target pollutants. Removal efficiencies are dependent upon the amount of time that the runoff remains in the pond. Models have suggested that two-thirds of pollutants are removed during the first 24 hours.

A wet pond may be used at a residential, commercial or industrial site and when maintained properly, may provide aesthetic value and recreational opportunities.

## Benefits

- Capable of removing both solid and soluble particles
- Wildlife habitat is created when ponds are properly planted and maintained.
- Depending on design, wet ponds can be aesthetically pleasing
- Sediment removal schedule is typically less frequent for wet ponds than other BMP's

### AT-A-GLANCE SUMMARY

#### Benefit

- Major ●  
 Moderate ◐  
 Minor/None ○

- Reduction in Peak Flow Rate ●  
 Runoff Volume Reduction ○

#### Pollutant Removals

- Sediment ●  
 Floatables ●  
 Heavy metals ◐  
 Oil and grease ◐  
 Fecal coliform ◐  
 BOD ◐  
 Total Phosphorous ◐  
 Nitrogen ◐  
 Costs ◐  
 Maintenance ○

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## Limitations

- Generally not recommended for drainage areas less than 10 acres
- Requires relatively large land area
- Improperly designed pond may result in stratification and anoxic conditions that can promote the release of nutrients and metals from the trapped sediments
- Cannot be placed on steep unstable slopes
- Concern for mosquitos and maintaining oxygen in ponds

## Costs

A similar equation to that used for dry ponds is used to calculate the construction cost of a wet pond (Brown and Schueler, 1997):

$$C = 24.5V^{0.705}$$

Where:

C = Construction, Design and Permitting Cost

V = Volume in the Pond to Include the 10-Year Storm (cubic feet)

Using this equation, a typical construction costs are:

\$ 45,700 for a 1 acre-foot facility

\$ 232,000 for a 10 acre-foot facility

\$ 1,170,000 for a 100 acre-foot facility

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## Maintenance

Maintenance requirements for a wet pond are significantly less intensive than for other BMP's.

Activity	Schedule
Note erosion of pond banks or bottom	Semi-Annual Inspection
Inspect for damage to the embankment Monitor for sediment accumulation in the facility and forebay Examine to ensure that inlet and outlet devices are free of debris and operational	Annual Inspection
Repair undercut or eroded areas Mow side slopes Pesticide/Nutrient management Litter/Debris removal	Standard Maintenance
Seed or sod to restore dead or damaged ground cover	Annual Maintenance (As needed)
Removal of sediment from the forebay	5 to 7 year Maintenance
Monitor sediment acculumations and remove sediment when the pond volume has been reduced by 25%.	25 to 50 year Maintenance

## Design Specifications

1. Ponds should be wedge-shaped and have a minimum depth of 3 to 4 feet.
2. All basins shall be designed and built with side-slopes no greater than 3:1 (three feet horizontal per one foot vertical).
3. Ponds should have a sediment forebay or equivalent pretreatment. The forebay should be 4 to 6 feet deep and designed to contain 0.1 inch of water per impervious acre of contributing drainage area.
4. The dam crest elevation shall not be less than one (1) foot above the emergency spillway invert or overflow elevation.
5. An additional water quality outlet must be installed to pass the extended detention water quality volume surcharge on top of the permanent pool. This outlet should be sized to release the extended detention water quality volume in 12 hours.
6. Discharge velocities within pipe must be controlled to same requirements as specified in Section 406. Erosion control linings for open channels must comply with requirements in Section 506.

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7. Storage, discharge, and routing calculations for the 2-year, 10-year, 25-year, 50-year and 100-year discharges must be submitted for review.
8. Spillways shall be protected from erosion and shall employ energy dissipation, if necessary.
9. Fencing may be required by the District or local governments when the location of the detention area is not easily observed or the side slopes of the basin are steeper than 4:1 (four feet horizontal per one foot vertical).
10. If required, ponds shall have dams and spillways that conform to the current Design Criteria For Dams and Associated Structures, Kentucky Division of Water. In cases when the top of the dam is also a publicly dedicated street right-of-way, the developer shall have a geotechnical report prepared with recommendation on the design and construction of the dam.
11. The designer shall include anti-seep collars, baffles, and outlet protection, when required.
12. Post construction BMPs must achieve the following goals:
  - a) In order to qualify for water quality credit under Sanitation District No. 1's Regional Storm Water Management Program Credit Policy, these practices must be sized to treat water quality volume ( $WQ_v$ ). The  $WQ_v$  shall be the maximized water quality capture volume for the site, as defined in "Urban Runoff Quality Management," WEF Manual of Practice No. 23 and ASCE Manual and Report on Engineering Practice No.87 (WEF and ASCE, 1998).
  - b) The  $WQ_v$  shall be determined through a site hydrologic study approved by the District that uses the following equation:

$$WQ_v = \Psi (0.858i^3 - 0.78i^2 + 0.774i + 0.04) * PA/12$$

Where:

$WQ_v$  = water quality volume in acre-feet

i = watershed impervious ratio (percent total impervious divided by 100)

P = mean storm precipitation depth in inches (0.52 inches in Northern Kentucky)

$\Psi$  = 1.109

A = area draining into the facility in acres

The Extended Retention Wet Pond should be designed with a drain time of  $WQ_v$  of 12 hours in order to increase the removal of TSS.

Maintenance accessibility and responsibility for maintenance shall be included.

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