

Retention/Detention Ponds

In a Nutshell

Retention or detention ponds are designed to help control stormwater runoff and improve water quality by collecting water and allowing the excess water to slowly drain. Retention ponds (aka wet ponds) retain a certain amount of water in the pond at all times. Detention ponds (aka dry ponds) drain all of their water usually within 72-hours. Both types of ponds can be effective tools in watershed planning and floodplain management.

The “How To”

Creation of a retention or detention pond should be undertaken only after careful consideration of the current-status and future-needs of the area. These ponds take up space and do require regular maintenance.

For a good overview of the subject matter please refer to the [Storm Water Technology Fact Sheet: Wet Detention Ponds](#). The document contains a lot of good information including an advantages/disadvantages section. The authors are quick to point out that the benefits far outweigh the disadvantages in most cases. The [Stormwater Best Management Practice Design Guide](#) provides a lot of information concerning retention and detention ponds. The article begins with an overview of the different types of ponds and where each is most appropriate. Next the article goes into design criteria. Design criteria include the use of formulas to determine the size of a pond. Finally the article includes a maintenance section.

This article on [best practices for water management](#), from the Missouri Office of Administration provides information on various kinds of retention/detention ponds. Discusses detention ponds (p. 1), extended detention ponds (p. 9), infiltration basins (p. 17) and infiltration trenches (p. 25). For each type of pond, the article has a short description, minimum requirements, and a more detailed description of the lay out of each type of pond.

Once the ponds are built, they do require regular maintenance. This article on [Maintaining Detention Ponds](#) provides a good overview of the topic. Maintaining detention ponds has information on the importance of maintaining a pond, examples of needed maintenance and even an inspection checklist. The City of Wentzville published a [Citizen’s Guide](#) for retention/detention pond maintenance.

Planning & Zoning

Retention ponds must be designed to keep people from trying to enter the pond area. Stormwater Magazine published an article for retention pond safety, “[Essential Safety Considerations for Urban Stormwater Retention and Detention Ponds](#).” Essential safety reviews specific safety hazards and the mitigation techniques that can be used to alleviate those hazards. Starting on page 7, the authors list specific examples of safety measures and the organization that employs them.

The EPA's [Storm Water Management Model](#) (SWMM) is used for the planning, analysis and design of drainage and sewer systems. These tools can aid communities as they look into general stormwater management and retention/detention ponds specifically. [The Recarga Model](#) is another excellent resource. The model is used to evaluate the performance of bioretention facilities, rain gardens and infiltration basins.

Communities can use this tool to evaluate their current stormwater management tools.

Dollars & Cents

The formula below was calculated by a study (Brown and Schueler, 1997) which is promoted by the EPA as the construction costs formula for retention ponds. Additional information on costs can be viewed on [EPA's website](#), keyword wet pond then search costs.

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

where:

C = Construction, design and permitting cost;

V = Volume in the pond to include the 10-year storm (ft³).

Using this equation, 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

Measuring Success

[The Recarga Model](#) is another excellent resource. The model is used to evaluate the performance of bioretention facilities, rain gardens and infiltration basins. Communities can use the Recarga Model to evaluate the performance of a new retention or detention pond. MSD uses the Recarga Model and [other performance measures](#) to evaluate stormwater management practices. These include the EPA's SWMM tool and other measures developed by MSD.

OneSTL's water quality performance measure will be an indicator of how successful a new retention or detention pond is. The desired trend is for water quality to go up.

Discover More

City of Wentzville's [Citizen's Guide for Detention & Retention Basin Maintenance](#)

Design and Plant Selection for [Bio Retention Facilities](#)

Missouri Department of Conservation provides [Education Grants](#) to support nature initiatives for schools.