Retention Ponds

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Introduction to Retention Ponds

A retention pond is a catch-all term for a catch-all pond. Retention ponds are basins that catch runoff from higher elevation areas. They are often created near development areas and have been gaining in popularity to the point they are required in many instances with new development of buildings, parking lots, roads, etc. Detention ponds are also created in these instances. The difference between the two is that a retention pond typically always has some water in it, hence the name retention pond. Conversely, a detention pond detains water during rainy periods. They are designed to help control runoff and limit flooding during high water times. A detention pond will hold water for a short period of time and slowly releases it. A retention pond will typically have an overflow pipe so it doesn't get too high, but there is typically water at all times.

Retention ponds are often fairly small in total acreage, typically less than an acre. They are also usually shallow with slow sloping bottoms. There is also typically a large area around the ponds that can accommodate high water during rainy times. This design is for function and safety. Since these ponds are in public areas, the shallow, slow sloping sides are needed for safety if people happen to fall in. The large

surrounding areas will provide adequate area for water storage when heavy rains are present. This is essential since most are installed near developed areas where the rain cannot soak in due to pavement and buildings. Often times, retention and detention ponds will be installed near each other in a row. The water will get held up in the detention pond and slowly drain into the retention pond. The detention pond will help eliminate flooding and the retention will hold the remaining water.

Purpose of Retention Ponds

Retention ponds are developed to serve two functions, limit flooding and pollutant removal. As mentioned above, retention and detention ponds are often developed in areas with significant construction. Buildings, roadways, parking lots, drive ways, etc. are all impermeable surfaces, or material water cannot soak into during a rainfall. Since the rain cannot penetrate these surfaces, it has no choice but to runoff to areas of lower elevation. Therefore, the more buildings and pavement in a given area, the more chances of flooding because the rain cannot soak into the ground.

Retention and detention ponds are developed in these areas as both temporary and permanent runoff basins. The rain runoff from the impermeable surfaces will find its way to the retention and detention ponds directly or through storm sewers. The ponds are built to handle a quick influx of water and slowly release it into another pond, stream, wetland, or slowly back into the ground. Either way, the ponds catch the large amounts of runoff water that occurs quickly and slows its release. The lag time from input to output eliminates or minimizes the effects of large rains and flooding.

Retention and detention ponds also serve to remove pollutants and trash. Since retention and detention ponds are the drainage basin for an area, they are a magnet for items like garbage. Trash and debris are washed into these areas often after heavy rains or wind. Plastic bags and other waste also enter from storm sewers that typically drain into a retention or detention pond. The trash can create an unsightly pond and harm the fish or other inhabitants of the retention pond.

Retention and detention ponds also catch other pollutants from runoff such as petroleum products from roadways, fertilizers from lawns and fields, sediments, bacteria, suspended solids, and metals. These pollutants can have negative affects on the overall water quality, such as pH, turbidity, nutrients, and hardness. The retention and detention ponds collect the runoff pollutants and allow them to settle out of the water and also get used up through biological processes.

When the pollutants enter the pond during a rain event, the pond slows the water movement, allowing the heavier pollutants such as suspended solids, sediments, and metals to settle out of the water column and come to rest in the bottom sediments. This greatly improves the overall clarity or turbidity of the water. Other pollutants such as the fertilizers are used in aquatic plant growth. Many of these nutrients are taken out of the water and used in plant growth. Bacteria can also be dealt with within the ponds biological processes. By retaining the water from runoff and allowing the pollutants to settle out or be used up, the water that is then returned to the ground or to neighboring streams, wetlands, etc. is of much better overall quality.

Make Your Retention Pond More Productive

Not all retention or detention ponds are created equal. Some retention ponds are much more effective at catching pollutants, removing or using up those pollutants, and discharging cleaner water than other ponds.

There are some things you can do to ensure your retention or detention pond is functioning efficiently, though.

Planning - Planning the proper size and location is the first step to creating a functional retention pond. If you have an existing pond, this step may not be of much use to you since you already have the pond. The first thing to remember is water runs down hill. As simple as that is, it can often be overlooked. A retention or detention pond needs to be created in an area that will allow it to catch as many of the runoff and pollutants as possible. The area needs to be low lying and the surrounding areas need to be sloped toward it so runoff from parking lots, road ways, etc. can drain into the pond. It is also crucial to make the pond the proper size and depth to accommodate the runoff water and allow the pollutants to settle out.

Aquatic Plants - Aquatic plants can add to the functionality, beauty, and diversity of your retention or detention pond. Emergent vegetation is great at slowing runoff before it enters the pond. Slowing the runoff allows suspended solids, sediments, and trash or debris to get blocked in the vegetation before it even reaches the pond. The trash can then be picked up and the rest will settle into the soil. Emergent vegetation also serves as a food source and hiding places for various wildlife species. Floating and submerged aquatic vegetation (and emergent vegetation, for that matter) serve to use up the nutrients that are added to the water from runoff. They serve to filter the nutrients out of the water. They also can serve as a food source and hiding places for fish and wildlife. All forms of aquatic vegetation can add to the beauty of the pond and its efficiency, but it is important to have a balance and plant species that will be of the most benefit. It is important to talk to a local lake management or nursery professional to get info on the best types of aquatic vegetation for your pond and its purpose.

Bacteria - Beneficial bacteria can be added to a retention pond to assist in decomposing and breaking down organic materials such as petroleum products and dead plants, fish, etc. The bacteria will serve to assist in the overall water quality by reducing the pollutants that are added to the pond and also help with the existing decomposition. The added plants that were discussed above will need to be decomposed after they die and the added bacteria will speed up the decomposition process and help ensure those nutrients don't get back into the water system. This step is another important one to consult a professional before you start.

Aeration - Oxygen is the key ingredient in any healthy marine environment. Dissolved oxygen in the water is essential for aquatic life, such as fish, insects, bacteria, aquatic plants, etc. Without proper levels of oxygen, a pond will not be able to support life and serve as a healthy ecosystem. This is even more important when discussing a retention pond. As discussed, retention ponds are collecting runoff pollutants and debris from the surrounding areas, holding that extra water, cleaning the water, and releasing back into the ground, streams, wetlands, etc. Proper aeration is vital for the retention pond to settle, filter, and use up the pollutants that enter during runoff.

Oxygen is essential for a retention pond to be productive. The pollutants that enter the pond, as discussed, either settle out or get used up in biological processes. The presence of oxygen helps oxidize certain elements that are suspended in the water. The oxidation process causes some materials to become heavier and they will settle out of the water column quicker.

The dissolved oxygen is also needed for decomposition of organic matter. The bacteria that are in the pond or that are added can decompose material aerobically (with oxygen) or anaerobically (without oxygen). Aerobic decomposition is a better process in your pond because it is quicker and produces less harmful byproducts. Without proper aeration, the bacteria will not be able to decompose the organic matter in the pond or that that is washed into it quickly or efficiently.

Agitation at the surface that is caused by an aeration device is also beneficial because it helps vent certain gases and elements from the water. Carbon dioxide is produced during aerobic decomposition and the large amounts of the gas can be detrimental to the pond and its inhabitants. By splashing the water and exposing a

larger surface area to the air, the higher concentration of carbon dioxide in the water can vent into the atmosphere. Other volatile pollutants can evaporate into the atmosphere when the water is exposed to the air.

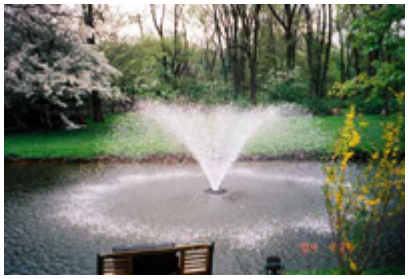
How Kasco Can Help

Since retention ponds are often fairly shallow and one of the main water quality benefits is that the suspended materials settle out, it is often a much better choice to go with surface aeration instead of bottom diffusers. Keeping the majority of the water movement and the agitation at the surface, the bottom sediments have minimal disturbance. This keeps the materials that have settled out from getting mixed back up in the water column.

Kasco offers Aerating Fountains, Pond Aerators, and Water Circulators to assist in water quality and retention pond health. Each has distinct advantages and is used in different applications.

An Aerating Fountain is a great choice when the retention pond is in a highly visible area because of the aesthetically pleasing display. With an aerating fountain, you get the best of both worlds, display and aeration. The water is being splashed and exposed to the air to provide dissolved oxygen and vent gases from the water. The display pattern produced can beautify your pond. An aerating fountain is not the best choice strictly for aeration, however, since the water flow is restricted to create the display.






A Pond Aerator is your best choice for surface aeration. The pond aerator will splash the water at the surface creating water agitation, high volume water flow, and adding dissolved oxygen. Since the flow is not restricted, as it is with a fountain model, the efficiency of water movement and aeration is much greater with a Pond Aerator. This is not the best choice for aesthetics, however.



A Water Circulator is ideal for creating directional flow and getting rid of stagnant water. Since the motor is mounted horizontally, the unit moves the water through directional flow. A water circulator is a great choice in odd shaped ponds with stagnant water areas or in situations where stagnant water is the biggest problem. A water circulator does not provide as much oxygen as a pond aerator and does not give you a display, but will keep the water moving.

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