

Pond Construction

This article outlines proper pond construction and is directed to rural landowners in Upstate New York who are building a pond for the first time. It contains many suggestions regarding planning, design, and construction of a new pond.

A lot of decisions related to pond construction may only apply to a specific site. Each piece of property has unique features, so plan on learning about how they affect your desire to maintain a pond on your property. Realistically, many rural properties are unsuitable for pond construction due to water supply, the lay of the land, or soil composition.

Before locating the pond, you should consider how you would be using your new pond. If you have not given this question careful thought, you will have a hard time creating a farm pond that is right for you. In the past, farm ponds were presumed to have a strictly agricultural purpose. With fewer farms and more interest in wildlife, fishing, and rural scenery, pond design now involves many additional considerations.

No matter the use of the pond, several requirements for pond construction are always in effect. New ponds must be

- located in the best spot possible
- supplied by a consistent water source, and
- constructed with an adequate spillway

Failure to meet these basic requirements will cause your pond to have a low water level, fall apart during a storm, or provide you with years of dissatisfaction due to weeds and poor fishing. Think of these points as the fundamental rules of pond construction.

Representatives from your county Soil and Water Conservation District or Natural Resource Conservation Service can help you make decisions about pond construction. Qualified contractors and engineers can also provide you with sound professional advice. It is worthwhile to ask questions and meet these professionals on your property to discuss your plans.

Locate the pond in the best site possible

Ponds function only as well as their setting allows. Three factors are used to site a pond properly: proper soils, avoided hazards, and slope. Of these, the slope of the land offers the most flexibility and will determine whether your pond is dug as a hole or impounded behind a dike.

Soil composition is one of the most significant factors in siting a pond. The soil should have low permeability and good compaction. Typically, this includes a high clay content

and relatively low organic content. Soils described as gravelly or loamy are usually unsuitable for pond construction without special provisions.

Some NY soil types ideally suited
for pond construction

Alden	Appleton
Mardin	Conesus
Erie	Fremont
Ilion	Lansing
Lyons	Chippewa
Ovid	Volusia

Technicians and contractors should refer to a soil survey to determine what kind of soil is present on your proposed pond site. Although many people are not aware of it, almost all of New York's soils have been classified with a particular name. For ponds, there are certain soil types that are ideal and others that are very improper. Learn what soil types exist around your property. If the property is large, there may be several different kinds of soil present from sandy to more clay-like. You cannot change your soil type; you must work with its limitations.

You should plan on digging test pits to analyze the soil before extensive pond work is started. Test pits are holes (4 – 6 feet deep), excavated by a backhoe in the area where the pond is tentatively planned. They will reveal the soil profile and give you a good sense of what lies in the area of the proposed pond.

Once you understand your soils, check for hazards in the vicinity of the proposed pond. Ponds should not be located near power lines, above roadways, next to off-road vehicle trails, or immediately upslope from homes or barns. If a pond embankment fails, everything down slope is at risk of flooding.

Consistent water source

Your pond will need a regular supply of water to stay full. During dry weather, ponds can lose an inch or more of water per day to evaporation and seepage. Without water flowing in, your pond can slowly dry down to a muddy pit.

The only way to know for sure whether a site has a good water supply is to dig test pits. If you already created test pits to observe soil conditions, they will serve this important additional function. Although test pits are an added expense, they will confirm how adequate the pond water supply will be. Think of them as "test ponds."

Underground springs provide the most dependable source of water. It can be difficult to determine whether a spring is in the area of your proposed pond. Check for wet areas in the summertime or brushy patches in farm fields where it was too wet to till. These on-site observations can provide valuable clues. Some county NRCS or Soil and Water Conservation District offices provide information about underground water.

If you cannot find evidence of an underground spring, the test pits will be even more important. You will want to be absolutely certain that a pond constructed on your property will hold water.

In the absence of a spring, you will have to rely on overland flow to your pond. Ponds with overland flow as their primary source of water usually have significantly fluctuating water levels – full in spring and low in mid-summer. The drainage area should encompass more than 20 acres. Runoff from land can bring excess silt and nutrients with the water, creating difficult water quality problems in the future. Additionally,

water flowing from land or surface ditches is warmer than spring water, seriously limiting the ability of the pond to host diverse wildlife.

Do not plan on diverting a stream or swamp to fill a pond. This creates several problems, including violations of state and federal laws, floods, siltation, compromised groundwater recharge, unwanted fish species, destruction of wildlife habitat, and bacterial contamination of the pond. Even if the stream is only intermittent, diversion is not recommended.

Adequate spillway

Getting water out of your pond is just as important as getting water into your pond. A pond spillway is a physical feature that controls the maximum depth of the pond. Dug ponds usually have a grassy or rock-lined outlet as a spillway. Dike ponds are built with grassy spillways, culverts, pipes, or inline water control devices. Regardless of the type of pond, it must include a spillway for excess water to exit the pond without undermining the structure of the pond.

Emergency spillways are highly recommended if the spillway is some type of pipe system. Pipes and culverts are subject to occasional clogging or wildlife damage, often during heavy storms. The emergency spillway serves as an escape way for water in flooded ponds. It is usually built as a shallow swale off one side of the pond, above the normal water line and below the top of the dike. It is a very important feature of dike ponds.

Spillway options for ponds

- Grassy outlet on one side of the dike
- Horizontal culvert through dike
- Vertical pipe that discharges water near the base of a dike.
- Inline water level control structure through dike

An inadequate spillway can create many problems for pond owners. If the water level rises above the spillway and crests over the top of a dike or embankment, fast-moving water will erode the dike into a gully. In fact, an inadequate spillway is the top reason why pond dikes fail. Depending on the site, water can be diverted before reaching the pond with a planned system of shallow ditches and pools.

Stages of pond construction

Though each pond is constructed differently, they usually follow several common steps. You should anticipate these steps to help pond construction personnel plan and create your pond.

All vegetation (trees, brush, and small plants) is removed from the pond site and an area around the site to prevent rooting problems in the pond structure. Then, the topsoil is cleared down to the lighter-colored subsoil. This creates a stable working area for pond construction equipment.

Many hours of bulldozer work are usually necessary to shape the pond bottom and compact the soils. A clay liner or soil amendments may be added if necessary. When completed, the pond bottom should include the features that meet your intentions for the pond.

If the pond is being constructed with a tall dike, a backhoe digs a core trench along the center of where the dike will sit. The trench is filled in and compacted with highly compressed soil, continuing until the dike core mound is created. This ridge of soil will anchor the dike on a hillside and prevent slumping and dike movement. Dug ponds do not require this feature, but they do need firmly compacted soils and some type of swale as a spillway.

At this stage in dike pond construction, a spillway pipe is laid into the mound. It should be surrounded with large metal or polymer plates, called anti-seep collars, placed perpendicular to the horizontal spillway pipe. The anti-seep collar prevents water leaking along the outside of the pipe.

When the core mound and anti-seep collar are in place, dike construction continues until the maximum height, width, and proper slope are built. The dike should be constructed entirely out of soil, avoiding the use of fill or debris. Some ponds begin filling even before the dike is completed. This is the sign of a pond that will likely be successful.

After the dike is completed, the original topsoil should be replaced to form a base for grass. Seed and fertilizer are broadcast across the dike to form a stable mat of turf covering the entire dike and any disturbed soils around the pond construction site.

Within a few weeks, the pond should contain substantial amounts of water, but it may take a long time to become completely full. Cloudy water will often settle if the weather is calm, but some contractors prefer to amend the water with substances that will cause faster clearing. Insects and other wildlife tend to enter the pond almost immediately and will start a procession of biological growth and activity in the pond. It is a good idea to wait a full season before adding fish.

Choosing a contractor

Hiring a company to dig or construct a pond can be challenging, so it is important to know what to look for. Take time to research who is good and who is just trying to make some side cash with their equipment. This might take several months of effort. Your local Soil and Water Conservation District office may have a list of contractors, and you should evaluate each one carefully.

A good pond construction contractor will have many satisfied clients, whom they would be happy to have you contact. They will have access to an engineer and can provide you with surveyed plans describing the shape, depth, and composition of the proposed pond. Make sure they have adequate insurance, and a written indication of how responsible they are for repairs if something goes wrong. They will explain why permits may or may not be needed and who will get the permits. Due to these services, a good pond construction contractor may cost more than other contractors. It is often money well spent if someone with experience recommends them.

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