



# Pond Building Guide for Clermont County



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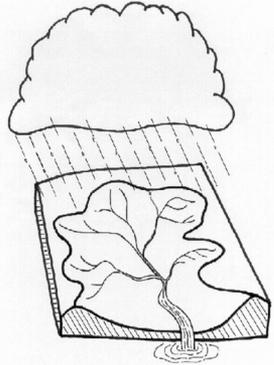
## **Introduction**

The purpose of this booklet is to provide information and assistance regarding proper pond construction in Clermont County. Some of the permits, regulations, and topics are specific for the county. If you are building a pond in another locality, consult your local resources. This booklet is not intended to transform you into a pond engineer, but help you understand the many aspects involved in pond planning, construction, and maintenance. Inside you will find the basic information to implement a plan for a properly functioning pond and the insight to effectively select and communicate with contractors.

When you decide to proceed with the planning or construction of your pond, contact the Clermont Soil and Water Conservation District (SWCD). We offer free assistance including technical advice, site analysis, maintenance, and long term assessment. Pond clinics are offered by our office and recommended. The District's goal is to help you construct and maintain a safe, functional, and attractive pond.

# Watershed

An accurate assessment of the watershed is needed before any planning is conducted. Ponds require a minimum of six acres of land per one surface acre of water (6:1 ratio) to maintain a pool elevation during excessively dry periods. Large land to water ratios require extensive engineering and permitting. Diversion swales and roof gutters are options to obtain additional water under certain circumstances when water is limited.



Any activity that occurs within the watershed will directly influence the quality and safety of the pond. Significant industrial, pesticide, septic pollution, and other high nutrient/sediment loading sources should be corrected or an alternative site should be chosen.

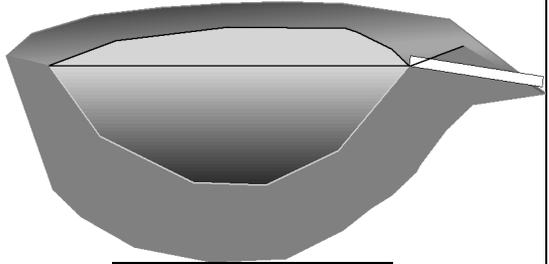
Excessive nutrients in the form of fertilizers and organic material (from such sources as mentioned above), cause the vast majority of problems in Ohio ponds with sudden outbreaks of weeds and algae. A low phosphorus fertilizer should be utilized around ponds when fertilizing is necessary following soil testing.

The Ohio Drainage Law considers ponds an accepted practice provided water is not flooded onto neighboring properties and water outlets property as it would naturally. Landowners may be held accountable for problems associated with pond outlets. Maintain a minimum distance of ten (10) feet from outlet to neighboring property and properly stabilize area to prevent excess erosion. It is not advisable to construct ponds in floodplains due to increased erosion caused during flooding events. A permit is required when building a pond in a FEMA floodplain. (see FEMA website on back cover)

# Excavated Ponds

Excavated, or dug ponds, are designed for relatively flat terrain and require the least amount of engineering to construct. Their capacity is obtained almost solely by excavation, making their practical size limited. For economy, locate pond where storage volume can be obtained with the least amount of earthwork. A true excavated pond has no dam structure.

Since excavated ponds are built to expose a minimum water surface area in proportion to their volume, they are advantageous in places where water is scarce. The ease of which they can be constructed, their compactness, their relative safety from flood-flow damage, and their low maintenance requirements make them popular in many settings within the county.



*Excavated or Dug Pond*

The general location of an excavated pond is dependent upon its purpose.

These ponds can be located in a broad natural drainage way or to one side of a drainage way if the runoff can be diverted into the pond. The low point of a natural depression is often a good location. After the pond is filled, excess runoff escapes through a spillway into the natural waterway.

Spillways should be properly designed following Natural Resources Conservation Service (NRCS) pond building specifications. Consult the Clermont Soil and Water Conservation District for these details.

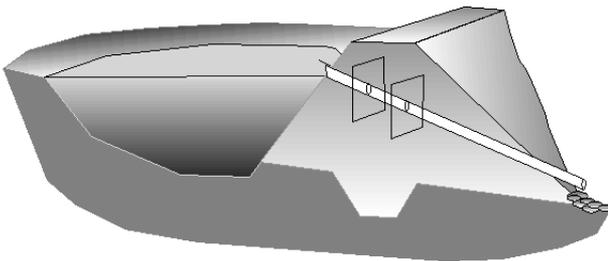
## **Embankment Ponds**

Embankment ponds are more complex in design than an excavated pond due to the embankment or dam that is involved to impound the water. Embankment ponds are typically larger in size than excavated ponds and are best constructed where the topography is moderately rolling.

Spillways must be incorporated into the design to prevent floodwaters from overtopping the dam. A principle spillway, usually a pipe that has been sized for that individual site, controls the waterline during most storm events. An earthen emergency spillway is also installed to capture large rain events and protect the dam from overtopping. Spillway pipes are installed with anti-seep collars to help prevent water seepage and/or failure.

Spillways should be properly designed following Natural Resources Conservation Service (NRCS) pond building specifications. A core trench needs to be installed to prevent dam seepage and slipping of the dam

Streams and creeks with constant or near-constant flow conditions have large watersheds associated with them, requiring vastly oversized and expensive spillway systems. Pond embankments must be maintained to prevent woody vegetation from establishing and are inspected for erosion and leaks regularly.



*Embankment Pond with Hooded Inlet*

## Soils

Sites containing hydric soils possess the most favorable characteristics for pond building. For example, Westboro Schaffer (formerly called Avonburg) and Clermont soil series have the best water holding potential in the county\*.

Fine textured clays and silty clays that extend well below the proposed pond depth are the most desirable pond soils. Embankments are constructed using soil that contain approx. 20% by weight clay particles (excessive clay can lead to cracking from shrinking and swelling). Avoid sites where soils are porous or are underlain by layers of coarse textured sand or sand gravel mixtures, such as floodplains and areas with shallow bedrock.

The characteristics of the soil are determined by digging test holes at intervals over the proposed pond site. These holes are excavated to a depth below the proposed water level for an accurate representation of the soil. Clermont SWCD can document these test holes and determine limitations that are present.

A tool for conducting **preliminary** site evaluations is the use of USDA Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/>). This website will give the limitations of your soil type, including pond building activities, based on surface soils present. Some limitations of soils may be overcome with proper engineering techniques.

Most, if not all, proposed sites in the county will rely on surface runoff for their primary source of water. Unlike other parts of Ohio, spring fed ponds are very rare and oftentimes unreliable to be used as the primary water source.

*\* Consult the **Clermont County Soil Survey**, Table 20, for pond limitations for each soil type present.*

# Earthen (Dam) Embankment

Construction begins by removing trees, brush, stumps, boulders, sod, and rubbish from the dam and spillway area. The sod and topsoil can be stockpiled and used for grass establishment on the embankment. Obtain suitable material from previously selected borrow areas and planned pool area. This material will be free of any material that could prevent the desired degree of compaction.

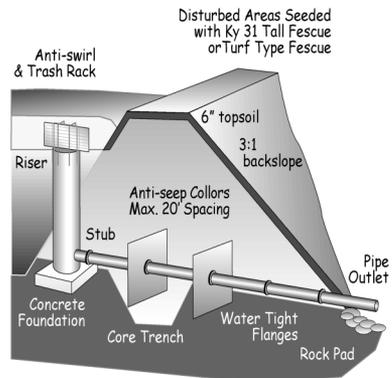
A core trench (keyway) is excavated as seen in the below diagram and compacted with proper soil to prevent leaching that may occur under the dam. This also helps stabilize the dam by reducing slippage.

Proper backfill materials are placed at the lowest point in layers approximately 6 inches thick and then compacted. Compaction surrounding any structure within the dam should occur with a power/hand tamper. Do not place fill in standing water.

Track or tire type machinery can be used to pack fill by routing equipment so each layer of soil is completely covered with tracks. Additional equipment such as a sheepsfoot roller may be required to obtain proper compaction.

**Dam widths are sized according to the amount of storage volume.**

## Typical Dam Cross-section



### Pipe Drop Structure in an Embankment Pond

Emergency Spillway  
Also Required

## **Soil Amendments**

Occasionally site conditions are not ideal, but the need for water is great enough to justify using the site. If so, the pond design must include plans for reducing seepage by sealing. Multiple options are available depending on site conditions. Rubber liners will not be discussed, but are another alternative to those listed below.

The proper technique is often determined by the proximity and amount of materials needed to remedy the problem at reasonable costs. Methods most commonly used on unacceptable soils may include:

### Compaction

Some soil types can be made relatively impervious by compaction alone if the soil contains a wide range of particle sizes such as small gravels, coarse to fine sand, and clay to effect a seal. Its use, however, is limited to these soil conditions as well as by the depth of water to be impounded. This is the least expensive method.

### Clay Blankets

Pool areas containing highly porous soils and lacking proper clay content can be sealed using a clay blanket. This involves lining the entire area over which water will be impounded, as well as the upstream slope of the embankment. This blanket should consist of properly-graded material and clay content. The requirements for good blanket material are consistent with those described for earthen embankments on the previous page. Often times suitable material are obtained from a borrow pit in close proximity to the pond site.

## Soil Amendments

Thickness of the blanket is dependent on the depth of water to be impounded. The minimum thickness is three feet for all depths of water up to 10 feet. Increase this thickness by two inches for every foot of water over 10 feet. Spread and compact as described in the Earthen Embankment section of this booklet.



Sheepsfoot roller used for soil compaction

### Bentonite

A natural clay, known as Bentonite, is another method of reducing excessive seepage in poor soils. When wet, it absorbs several times its own weight of water and at complete saturation, swells 8 to 20 times its original volume. Mixed in the correct proportions with well graded coarse grained material, thoroughly compacted and then saturated, the particles of bentonite swell until they fill the pores to the point that the mixture is nearly impervious to water. However, upon drying bentonite returns to its original volume leaving cracks. For this reason sealing with bentonite is usually not recommended for ponds in which the water level is expected to fluctuate widely. A laboratory analysis of the soil material is needed to determine the rate of application.

## Excess Material

Unlike an embankment pond, an excavated pond requires the transport of soil away from the pond site for disposal. Keep in mind, the larger the pond, the more soil to be transported. Pond sites lacking proper disposal areas may require costly off-site removal. To minimize hauling costs, landowners may determine if local uses are available for this material.

Plan the placement or disposal of the material excavated from the pool area in advance of construction operations.

Adequate placement prolongs the useful life of the pond, improves its appearance, and facilitates maintenance and the establishment of vegetation. The excavated material can be stacked, spread, or removed from the site as conditions, nature of the material, and other circumstances warrant. Offsite movement of 100+ cubic yards of soil requires both parties to obtain a WMSC permit at Permit Central (see page15).



On-site placement is conducted in a manner that the soil weight does not endanger the stability of the pond banks and rainfall will not wash the material back into the pond. Do not place fill where water will be prevented from entering the pond or cause drainage problems to neighbors. Quick establishment of vegetation will prevent excess soil from eroding offsite or into pond.

### Excavated pond earth removal example:



The amount of soil removed from a one (1) acre excavated pond 8 foot deep will cover a football field (1.1 acres), without the end zones, 8-10 feet deep.

## **Safety and Liabilities**

Ponds, like any body of water attract people, so there is the risk of an accident occurring. Regardless of the intentions for the proposed pond, people may be drawn to the pond for various reasons. In Ohio, the “attractive nuisance doctrine” places a duty upon landowners to protect foreseeable child trespassers from dangerous conditions on the owner property.



It is the responsibility of the pond owner to ensure that the pond is as safe as possible. Safety/rescue equipment should be easily accessible in the case of emergency. This may include a life buoy, a long pole, or other equipment. Signs should be posted where dangers are present, such as submerged hazards or sudden drop offs. Depending upon your surroundings, fencing may need to be installed. Check with your insurance agent to determine your legal liabilities and coverage needs.

Having a properly constructed pond is important to the safety of downstream lives and structures. Careless or shoddy construction could create a liability in the event of pond failure, regardless of pond size. Repairs and reduction of hazards may cause unwanted future expenses if not addressed properly in the design or during pond construction.

Ohio laws are quite favorable to pond owners, if certain responsibilities towards the public are addressed or in legal terms “duties of care”, are taken. This includes protection from known and unknown dangers, but are not easily defined by law. Under the law, it depends on the type of visitor (business, licensee, trespasser, or guest) and the type of injury sustained, as to what capacity you as a landowner are responsible.

**Recommended material-OSU Extension Fact Sheets:**  
*Farm Pond Safety* and *Ponds and Legal Liability in Ohio*

## **Additional Tips**

### Choosing a Contractor

Choosing the proper contractor for the project is essential to having a successful pond. Always acquire multiple bids and references. Prior experience in pond construction is desirable when choosing a contractor. Taking shortcuts to save time or money may cost you more in the future for maintenance and repairs or cause legal issues in the event of dam failure. A local contractor list is available on our website or at the SWCD office. Contact our office to have your name/company added to this list.

For those Do-It-Yourselfers, building an embankment pond is challenging and best left to experienced professionals. Dugout or excavated ponds are much less challenging to construct. With proper guidance and equipment, these type ponds can often times be constructed successfully by individuals with little or no experience in pond building.

### Checking for Utilities

Prior to construction, it is required to call the Ohio Utilities Protection Service (OUPS) to locate any underground utilities. This free service alerts local utility companies that groundwork may occur and to verify/or mark their utilities. This can be done through their website ([www.oups.org](http://www.oups.org)) or by phone.



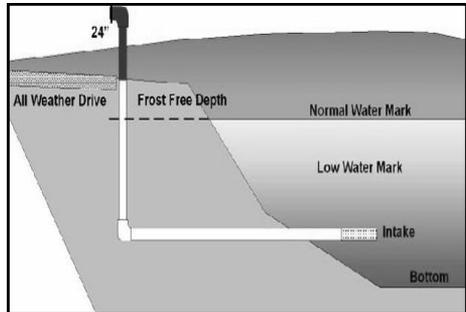
### Geothermal

Pond construction should not begin before contacting the company that you intend to purchase your geothermal unit from. Most units have specified requirements for pond size and depth. Verify that the pond dimensions will meet these specified requirements.

## **Additional Tips**

### Dry Hydrant

A dry hydrant is a permanent PVC piping system installed in a pond, lake, or stream that allows for easy water withdrawal for fire suppression in areas that lack pressurized fire hydrants. Cost share is available through the SWCD for installing this practice in both new and existing ponds.



Dry Hydrant Diagram

Contact our office for details regarding our dry hydrant program.

### Cost Share with NRCS

The Natural Resource Conservation Service (NRCS) administers Farm Bill Programs where cost-share is available to farmers to fence livestock out of ponds and streams, add watering systems for livestock and irrigation, and other environmental practices to protect your water supply. Contact the NRCS office for more information and how to enroll in these programs. Engineering assistance is available for any landowner in the county. **Currently there is no cost-share money available for pond construction.**

### Muskrat Control

Muskrat control structures can be installed in new and existing ponds. Every pond will eventually have some sort of muskrat problem, sometimes causing severe pond damage. A few control options to consider to minimize damage includes: lining the banks with rock, wire mesh/chain link fence, or a poured concrete barrier. Those ponds located near waterways will encounter increased problems with muskrats as they travel these corridors. Muskrats are attracted to ponds with cattails and other rooted plants, as the roots are a desired food.

# **Regulations**

When deciding on pond dimensions during the design phase of planning, it is often useful to understand the laws and permitting process. Oftentimes a small variation in design may be the difference in extensive permitting or “flying under the radar”. Here are the permits that may be required:

## **US Army Corp of Engineers (USACE)**

A permit is needed when working in streams, wetlands, and dry streambeds. A stream is recognized as a waterway with a defined bed and bank. Wetlands are not always easily recognizable and may only maintain standing water during part of the year. It is illegal to fill, dredge, or alter wetlands without permission from USACE and/or Ohio EPA. Ohio EPA may be involved in the permit process after a USACE site determination.

Contact the USACE for determinations and permitting for your location. Some ponds may require a Nationwide Work Permit (NWP) that may include a minimal filing fee.

## **Clermont County Permits**

A Water Management and Sediment Control (WMSC) permit is required for any earth moving activity that involves moving 100 cubic yards of soil or more (on site or off). Permits are obtained from Permit Central on Bauer Road near Batavia. These permits are not required for agricultural use ponds.

The County adopts and maintains Flood Plain Regulations in order to comply with the National Flood Plain Insurance Program per FEMA requirements. Approval is required for all work or development to property in special flood hazard areas. Floodplain info can be found on the FEMA website (back cover) or your local floodplain office.

# **Regulations**

## **ODNR Dam Safety**

The Dam Safety Program regulates the construction, operation, and maintenance of Ohio's dams and levees to protect life and property from damages due to failure. This is accomplished through periodic inspection, new dam construction permits, and regulation of improvements, maintenance and operation of existing dams. Traditionally ponds in the county are small in size or excavated making them exempt from this permit. This classification can change over time due to changes in downstream activity.

### **Exemptions:**

A dam is exempt from the state's authority under the Ohio Revised Code (ORC) Section 1521.062 if it is 6 feet or less in height regardless of total storage; or less than 10 feet in height with not more than 50 acre-feet of storage, or not more than 15 acre-feet of total storage regardless of height.

Please check out Dam Safety website for more information or contact ODNR directly for more information. Excavated ponds are exempt under this permit regardless of size.

*<http://www.dnr.state.oh.us/water/tabid/3329/Default.aspx>*

## **Additional Regulations**

Check with city/township ordinances for any regulations on pond site developments.

If clearing is conducted for pond sites, the Ohio Fire Law states that open burning is prohibited in unincorporated areas during the months of March, April, May, October, and November between the hours of 6 am to 6 pm. Check with your local fire department for additional regulations regarding open burning.

# Resources

Clermont Permit Central .....	(513) 732-7213
Clermont SWCD .....	(513) 732-7075
Floodplain Permits: County .....	(513) 732-7213
Loveland City .....	(513) 683-0150
Milford City .....	(513) 248-5093
New Richmond Village .....	(513) 553-4146
NRCS Owensville Field Office .....	(513) 732-7075
ODNR Dam Safety .....	(614) 265-6731
Ohio EPA Permitting (Southwest Ohio) .....	(614) 644-2327
Ohio Utilities Protection Service (OUPS) .....	(800) 362-2764
OSU Extension-Clermont .....	(513) 732-7070
US Army Corp of Engineers (Cincinnati Office) ..	(800) 825-2752
US Army Corp of Engineers (Huntington Office) ..	(866) 502-2570

## Informative Websites

Clermont Permit Central .....	<a href="http://permit.clermontcountyohio.gov/">http://permit.clermontcountyohio.gov/</a>
Clermont SWCD .....	<a href="http://www.clermontswcd.org/ponds.aspx">www.clermontswcd.org/ponds.aspx</a>
FEMA Floodplain Maps .....	<a href="http://www.fema.gov/">http://www.fema.gov/</a>
ODNR Dam Safety .....	<a href="http://www.dnr.state.oh.us/water/tabid/3329/Default.aspx">http://www.dnr.state.oh.us/water/tabid/3329/Default.aspx</a>
ODNR .....	<a href="http://www.dnr.state.oh.us/">http://www.dnr.state.oh.us/</a>
Ohio Drainage Law .....	<a href="http://ohioline.osu.edu/b822/index.html">http://ohioline.osu.edu/b822/index.html</a>
OSU Pond Fact Sheets .....	<a href="http://ohioline.osu.edu/a-fact/index.html">http://ohioline.osu.edu/a-fact/index.html</a>
OUPS .....	<a href="http://www.oups.org">www.oups.org</a>
US Army Corp of Engineers ...	<a href="http://www.lrh.usace.army.mil">www.lrh.usace.army.mil</a>
Web Soil Survey .....	<a href="http://websoilsurvey.nrcs.usda.gov/app/">http://websoilsurvey.nrcs.usda.gov/app/</a>

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