

A POCKET GUIDE TO CONSTRUCTING A POND



LAWRENCE COUNTY
SOIL AND WATER CONSERVATION DISTRICT
USDA NATURAL RESOURCES
CONSERVATION SERVICE

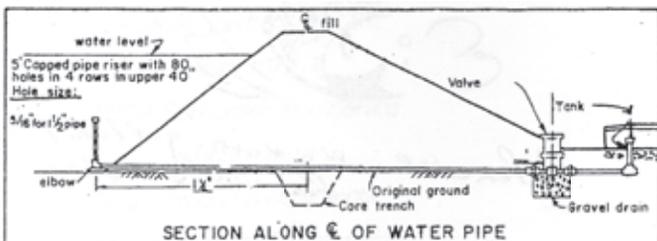
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Your pond can be used for a LIVESTOCK WATERING SYSTEM. (PICTURED ABOVE)

Clean water for cattle can be supplied with a 1-1/2" PVC pipe through dam. Fencing the pond protects the pond dam from erosion and greatly improves water quality. Contact SWCD & NRCS office for on-site assistance.



PREFACE

This booklet is intended to be used as a guide for those who are considering building a pond. It can serve as a handy reference to some of the things that need to be understood before, during, and after construction of a pond.

Before constructing a pond, proper consideration should be given to planning and designing a pond. You may want to contact your local Soil and Water Conservation District (SWCD) in association with the USDA Natural Resources Conservation Service (NRCS), or contact an engineer qualified in pond site investigations and dam construction.

For more information, contact:

Lawrence County

Soil and Water Conservation District Office

1919 Steven Avenue

Bedford, IN 47421

(812) 279-8117, ext. 3

FAX (812) 279-1394

lawrencecountyswcd.org

FISHPOND STOCKING

The recommended stocking rates are listed below, as per USDA Natural Resources Conservation Service and Indiana Department of Natural Resources. These amounts are for one surface acre of water in size.

Species	Stocking Size	Number
Largemouth Bass	3" - 4"	200
Bluegill	1" - 2"	1000
Channel Catfish	over 6"	100

If redear are desired, replace 1/4 of the bluegill fingerlings with 1" - 2" redear fingerlings.

Adjust these rates to the size of your pond.



Reference: <http://www.in.gov/dnr/fishwild/2348.htm>

Keep in mind all these factors as your start on the search for your pond site, considering all the joy and excitement that may be ahead. Remember, planning and evaluating will save you the disappointment of a good pond gone bad!



REFERENCE

1. "Ponds - Planning, Designing, Construction"
Agriculture Handbook No. 590
2. Ponds for Water Supply and Recreation
Agriculture Handbook No. 387
Issued January 1971
USDA Soil Conservation Service
For Sale by:
Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402
3. USDA, NRCS, INDIANA
<http://efotg.nrcs.usda.gov/treemenufs.aspx>
Standard 378 10-2002
4. Web Soil Survey
<http://websoilsurvey.nrcs.usda.gov>

POND

- What is a pond?

It is a water impoundment made by constructing a dam or an earthen embankment, or by excavating a pit or dugout.

- What is a pond good for?

A pond can provide water for livestock, fish and wildlife, recreation, fire control, crop and orchard spraying, and irrigation. A pond is also used to maintain or improve water quality, control excessive runoff and soil erosion, and improve aesthetic values.

- What kind of ponds are there?

An embankment pond is made by building an earthen embankment or dam across a stream or watercourse. These ponds are usually built where stream valleys are depressed enough to allow constructing an embankment 9 feet or higher and to permit storing 6 feet or more of water. The land slopes may range from gentle to steep.

An excavated pond is made by digging a pit or dugout in nearly level areas. Because their capacity is obtained almost entirely by digging, excavated ponds are normally used where only a small supply of water is needed. Some ponds are

built in gentle to moderately sloping areas and their capacity is obtained both by excavating and by building a dam.

- Will it satisfy my water needs?

FOR LIVESTOCK -

Water is as important as forage in the production of livestock. Clean water and ample forage are essential for livestock to be finished out in a marketable condition. Inadequate stock-water developments in pasture and range areas contribute to instability in the livestock industry and to serious livestock losses, limit needed grazing areas, and encourage overgrazing near existing water.

Enough watering places in pastures encourage more uniform grazing, facilitate pasture improvement practices, and retard erosion.

FOR IRRIGATION -

Farm ponds can be an important source of irrigation water, particularly for small acreage of specialty crops. Water requirements for irrigation are great. The area irrigated from a farm pond is limited by the amount of water available throughout the growing season. Pond capacity must be adequate to meet crop requirements and to overcome unavoidable water losses.

rates and recommended seed mixtures adapted to your area, contact your local Soil and Water Conservation District.

-What kind of maintenance and operational costs are there?

The cost of a pond does not end when the construction equipment has left the site and the grass is up and growing. Plan for recurring annual items such as mowing, fertilizing, and debris removal along the water line on the dam. Also plan for periodic items such as restocking of fish, replacing broken items on spillways and fishing piers, docks, etc.

Inspect the dam on a regular basis to check for signs of leaks or seepage. There should be no woody vegetation on the dam. If some starts to grow, remove it immediately. Seepage problems arise if the water follows along the roots of a tree in the dam. Watch for burrowing animals, such as groundhogs or muskrats. While they may not affect a well built dam, they cause problems if the dens are located in the top portion of the dam where it becomes narrow. Keep spillways free of trash and debris so they will work as intended during heavy storms. Do not park or store any items in the emergency spillway.

Before beginning to place the earthfill materials for the dam, all trees, stumps and other vegetation shall be removed from the area under the proposed dam. All topsoil should be stripped and stockpiled for later use over the top of the dam surface. The spreading of the topsoil will aid in the establishment of vegetative cover.

Earthfill dams are to be constructed by placing the impervious material in horizontal layers (lifts) no thicker than 8 inches and compacting each layer before placement of the next layer. This will ensure that the dam will be impervious and will adequately support itself after the pond has filled with water.

Upon the pond filling, the dam will become saturated. The dense compaction of the earthfill limits the amount of water that can saturate into the dam and therefore allows the dam to maintain its sheer strength against slippage and slides. During construction of the dam, the most impervious material available should be placed in the center core of the dam.

Upon completion of the dam and smoothing out of the area, the seeding and mulching work should be completed as soon as possible. For fertilizer

FOR FIRE PROTECTION -

A dependable water supply is needed for fighting fires. If your pond is located close to your house, barn, or other buildings, consider providing a dry hydrant or drafting basin accessible to your fire department equipment. Approximately 1,000 gallons per minute must be delivered to a fire within just a few minutes to suppress the heat and be effective.

FOR RECREATION -

A pond can provide many pleasant hours of swimming, boating, and fishing for you, your family and friends. The surrounding area can be made into an attractive place for picnics and games.

Many land users now recognize that additional income can be realized from providing water for public recreation use. However, it is not necessary to provide public access to the pond if government funds are used for construction of the pond. If the public is invited to use the pond for a fee, it must be large enough to accommodate several parties engaged in whatever recreational activities are provided.



FOR WATERFOWL AND WILDLIFE -

Ponds attract many kinds of wildlife. Migratory waterfowl often use them as a nesting place in their flight to and from the North. Geese and ducks often use ponds as breeding places, particularly where there is an ample supply of food. Upland game birds and other wildlife species use ponds as watering places.

FOR MULTIPLE PURPOSES -

You may wish to use the water in your pond for more than one purpose. For example, you may wish to provide water for livestock, fish production, and spraying your field crops. If so, two additional factors must be considered.

First, in estimating your water requirements you must total the needs for each purpose and be sure that you provide a supply adequate for all of the intended uses. Second, make sure that the purposes for which the water is to be used are compatible. Some combinations such as irrigation and recreation usually are not compatible. You would probably use most of the water during irrigation season, making boating and swimming impractical. Whereas, use of the same pond for waterfowl nesting and migration could be compatible with fishing and swimming uses.

- *What key things contribute to a good dam?*

Most farm ponds are created by constructing an earthfill embankment across a valley. The operation and maintenance of the dam depends a great deal upon the amount of earthfill material used to build the dam. The dam must extend above the permanent water level to provide for flood storage and freeboard.

The top width of the dam should be a minimum of 8 to 12 feet, depending on the height of the dam.

When the top of the embankment will be used as a roadway, the top width of the dam should be a minimum of 16 feet for one-way traffic and 26 feet for two-way traffic. If the dam is part of a recreation enterprise where the public is invited, guard rails should be placed along the sides of the roadway crossing the dam.

The side slopes of the dam will be critical in determining the ease of maintenance, particularly when machine mowing is planned. If frequent mowing is done, the slopes of the dam should be no steeper than 3 feet horizontally to 1 foot vertically. If mowing is planned for once or twice a year, no steeper than 2.5 feet horizontally to 1 foot vertically will suffice, but flatter slopes would be better.

Also note the depth of the soil in the impoundment area in order to judge the availability of impervious earthfill material for the dam. Three or four borings per acre may be enough if the soils are uniform over the pond site. More may be required if there is a variation in the soil conditions.

- What goes under the dam?

A cutoff trench of relatively impervious material shall be provided under the dam. The cutoff shall be located at or upstream from the centerline of the dam. The trench shall extend up the sides of the valley to the height of the impounded water level and be deep enough (2 foot minimum) to extend into a relatively impervious layer or provide for a stable dam when combined with seepage control. Where the possibility of subsurface drains exist, the cutoff should be deep enough to intercept them. The cutoff trench shall have bottom width (8 foot minimum) adequate to accommodate the equipment used for excavating, backfilling, and compacting of the cutoff trench. The sides of the trench shall not be steeper than 2 feet horizontally for every 1 foot vertically. The most impervious material available shall be used to backfill the cutoff trench and to construct the center core area of the dam.

- How do I know where to put my pond?

Selecting a suitable site for your pond is important. Preliminary studies of any site are needed before construction. If you are considering more than one site, study each one to select the most practical and economical site.

To get the most pond for the money, locate it where the largest storage volume or surface area can be obtained with the least amount of earthfill being required to construct the embankment.

A good site usually is one where the dam can be built across a narrow section of a valley or just below a fork in the valley. The side slopes of the valley should be steep to avoid shallow water around the edges of the pond. The slope of the valley floor should permit water to flood a large area upstream of the dam. Such sites will minimize the area of shallow water which results in excessive evaporation and growth of aquatic plants.

If farm ponds are used to water livestock, make one available in or near each pasture or other grazing unit. Since forcing livestock to travel long distances to water is detrimental to both the livestock and the grazing area, the distance between water sources is important.

Space watering places so that livestock does not have to travel more than a half mile. Well spaced watering places encourage uniform grazing and aid in the management of your grassland. See back page.

If water must be conveyed for use elsewhere, such as irrigation or fire protection, locate the pond as close to the major water use as practical. The pond should be located in a position so as to obtain gravity flow to the point where the water is needed. Conveying water is expensive and if the distance is excessive, the intended use of the water may not be practical.

Ponds for fishing, boating, swimming, or other recreational uses must be easily reached by automobile. This is particularly true if the general public is charged a fee to use the pond. The success of an income-producing recreation enterprise often depends on accessibility.

Avoid pollution of your pond water by selecting a location where drainage from barnyards, feed lots, sewage lines, and similar areas does not reach the pond.

BE AWARE OF UTILITY LINES

Be sure that no buried pipelines or cables cross a proposed pond site. They could be broken or punctured by the excavating equipment, which not

Areas underlain with shale bedrock have less risk. These bedrock formations do not have the occurrence of cracks, sinkholes, and fissures as the limestone bedrock areas.

The geologic investigation shall be in sufficient detail to determine that the impounded area will retain water, that the dam site is suitable to support an earthfill embankment, that adequate soil material is available to construct impervious earthfill embankments, that the mechanical spillway will have a stable foundation, and that the emergency spillway can be excavated as planned.

The investigation for any dam which requires Indiana Department of Natural Resources (IDNR) approval should meet their requirements. Contact IDNR Division of Water, Indianapolis, Indiana at (317) 232-4160 for details concerning construction of any dam which will have a drainage area of 640 acres or more, will have a dam height of 20 feet or more, or will impound 100 acre-feet or more of water. No local permits are needed in Lawrence County, but this may not be true for all counties.

Make soil borings at regular intervals over the area to be covered with water unless you know the soils are sufficiently impervious and leakage will not be a problem.

- What kind of soil do I need at my pond site?

Suitability of pond site depends upon the ability of the soils and bedrock in the reservoir area to hold water. The soil should contain a layer of material that is impervious and thick enough to prevent excessive seepage. Clays and silty clays are excellent for this purpose, sandy clays are usually satisfactory. Coarse textured sands and sand-gravel mixtures are highly permeable and therefore usually unsuitable. The absence of a layer of impervious material over part of the ponded area does not necessarily mean that you must abandon the proposed site. You can treat these parts of the area by one or more of several pond-sealing methods. Any of these methods can be expensive.

Most areas underlain by limestone bedrock are especially risky for pond sites. There may be crevices, sinkholes, or channels in the limestone beneath the soil mantle that are not visible from the land surface. These may empty the pond in a short time. In addition, many soils in limestone areas have a granular structure. Since the granularity does not break down readily in water, the soils remain highly permeable. Without extensive investigations and related laboratory tests, it is difficult to recognize all the factors that may make a site in limestone areas undesirable.

only may result in damage to the utility, but also may injure the operator of the equipment.

Avoid sites under power lines. The wires may be within reach of a fishing rod held by someone fishing from the top of the dam.

If it is necessary to use a site crossed by a utility line, notify the utility company before starting construction. The company's permission is required and the pond construction may not be allowed if it conflicts with the operation and maintenance of the utility line.

KEEP IN MIND THE HAZARD POTENTIAL

Do not overlook the possibility of failure of the dam and the resulting damages from sudden releases of water. Do not locate your pond where failure of the dam could cause loss of life, injury to persons or animals, damage to railroads or highways, or interrupted use or service of public utilities. If the only suitable site for your pond presents one or more of these hazards, engage the service of a qualified engineer to reduce the possibility of failure from improper design or construction. You, as the pond owner, are responsible for the pond and its proper operation and maintenance.



- How big of a pond do I want?

The topography and soils of the site shall permit storage of water at a depth and volume that ensure a dependable supply, considering beneficial uses, season of uses, sedimentation from erosion, evaporation and seepage losses. If surface runoff is the primary source of water for the pond, the soils must be impervious enough to prevent excessive seepage losses or be of a type that sealing of the pond is practical.

Minimum water depth should be 8 feet over at least 25 percent of the pond area at permanent water level, or, where the underlying bedrock prevents excavation to that depth, a minimum depth of 6 feet over 50 percent of the pond area should be obtained.

When the primary purpose is for fish production, at least 75 percent of the shoreline should be steepened to a slope of 3 feet horizontally to one foot vertically to a depth of 3 feet below the permanent water level. Excess excavated material can be used to construct nesting islands and/or earthen fishing piers extending out into the pond.

Ponds or pits primarily for fish production should have a minimum surface area of no less than 0.25 acre when stocked with a single specie or a

minimum surface area of 0.5 acre when stocked with two or more species. Check with your local fish hatchery for stocking rates. (Recommended stocking rates are included in the back of this pocket guide). All others should have a surface area adequate for the intended purpose, with a minimum area of 0.15 acre for excavated ponds and 0.25 acre for embankment ponds.

- How much drainage area do I need?

The drainage area above the pond must be protected against erosion to the extent that expected sedimentation will not shorten the planned effective life of the pond. The drainage area should be large enough so that surface runoff and ground water flow will maintain an adequate supply of water in the pond. The ratio of the pond surface area to the drainage is ideally about 1:10.

If the ratio is low, the drainage may not yield sufficient water to maintain the pond level. If the ratio is high, the spillway system for the pond will become expensive and may make the pond site economically unfeasible.

The water quality shall be suitable for its intended use. Runoff water from barnyards, feed lots, septic tank, or other sources of contamination shall be delivered so as not to flow into the pond.