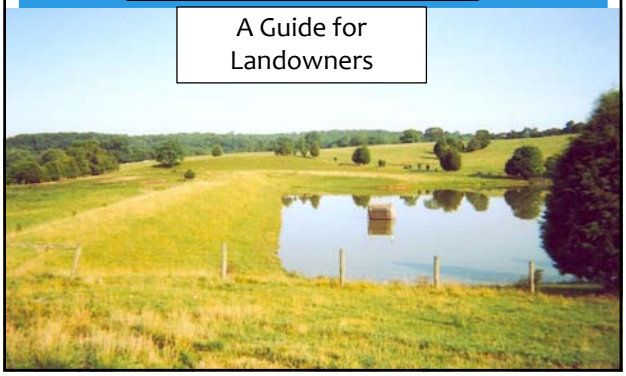
Pond Planning

A Guide for Landowners



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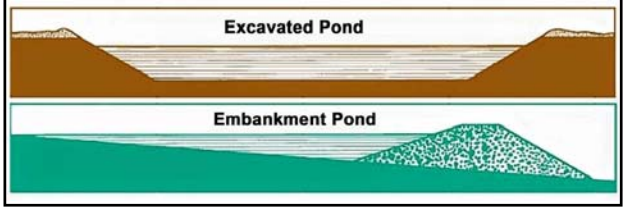
What is a Pond?

- Excavated
  - A dugout hole
  - Fed by groundwater
- Embankment
  - Fill berm across a stream/swale.
  - Fed by surface water



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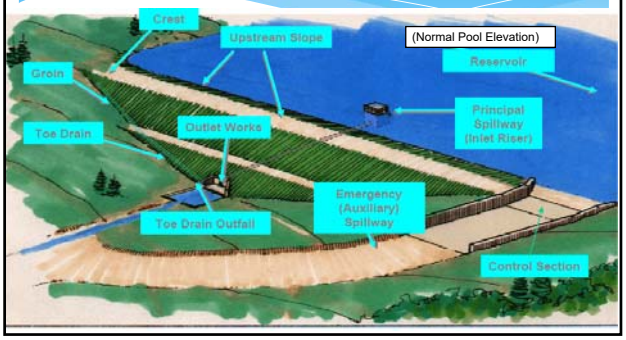
Basic Embankment Pond



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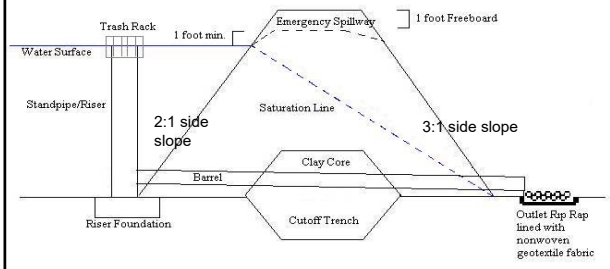
Ideal Pond Design



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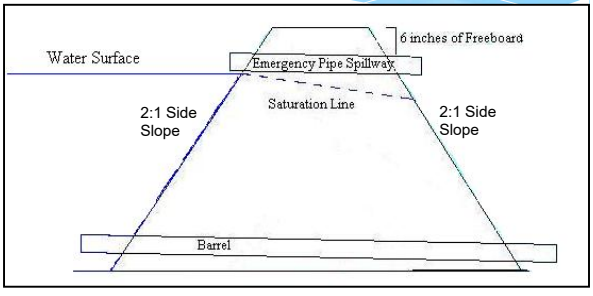
Problematic Pond Design



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Why a Pond?

- Fishing
- Swimming
- Wildlife
- Livestock
- Fire suppression

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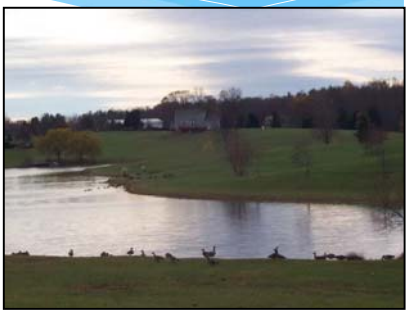
If you Dig it, Will it Fill?

Pond Planning

- Site Selection
- Soils
- Permits



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Site Selection Criteria

- Water Need
  - Farming vs. Recreation
- Water Supply
  - Perennial Streams
  - Intermittent Streams
  - Surface Runoff (Drainage Area)
- Sediment Supply
  - Sediment Storage?

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Site Limitations

- Topography
  - Valley Slope
  - Valley Width
- Soils
  - Suitabilities
  - Properties
- Zoning & Building Setbacks
  - Embankment Setbacks
  - Pool Setbacks

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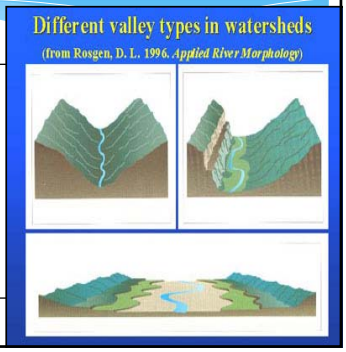

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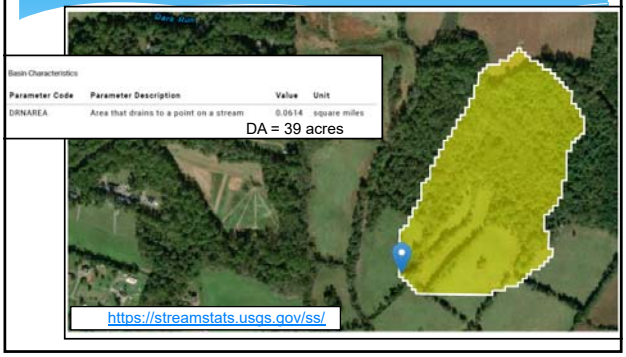
Drainage Map



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Estimating Pond Capacity

- Establish Pool Elevation and Stake Waterline
- Measure Width of Valley at this Elevation
- Compute Surface Area
  - 1 acre =43,560 square feet
- Multiple Surface Area and Maximum Depth by 0.4
- Convert to Gallons
  - 325,900 gallons in one acre-foot

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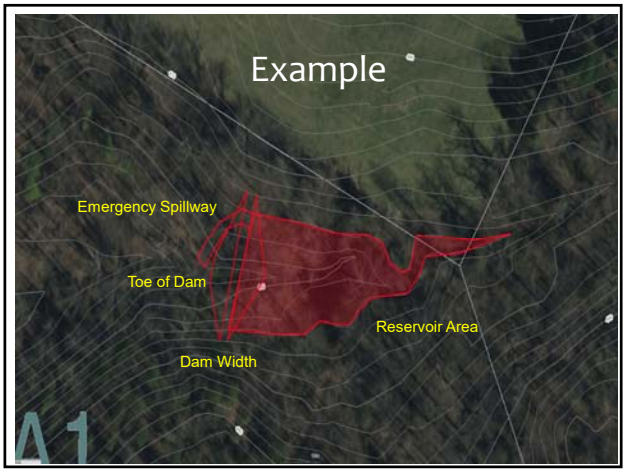
Example



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Permits

- Wetland/Stream Impacts
- Dam Safety
  - Height =25 feet (measured from downstream channel)
  - Volume =15 acre-feet (4.9 million Gallons)
  - Ag Exemption for <100 acre-feet
- Land Disturbing (County Building/Zoning Office)

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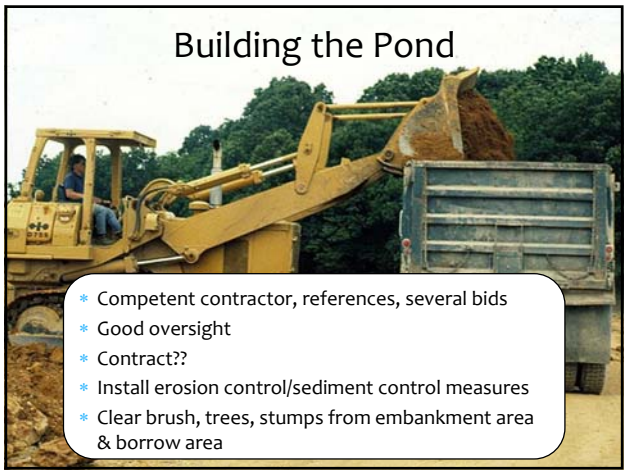
Building the Pond



- Competent contractor, references, several bids
- Good oversight
- Contract??
- Install erosion control/sediment control measures
- Clear brush, trees, stumps from embankment area & borrow area

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Maintenance

- Dam Embankment
- Emergency Spillway
- Riser
- Water Clarity
- Dredging
- Shoreline

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Common Problems

- Undesirable Vegetation on Embankment
- Deterioration of Concrete Footers & Headwalls
- Corrosion of Pipes
- Inoperable Gate Valves
- Seepage along Pipe and Embankment Toe
- Sinkholes caused by Leaks and Pests
- Erosion of Side Slopes
- Aquatic Weeds

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Sloughing

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Piping

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Seepage

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Standpipe Failures

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Aquatic Weeds

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Thanks!

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ESTIMATING POND CAPACITY IN ACRE-FEET

1. Establish normal pool elevation and stake the waterline at this elevation. (average depth 6 feet minimum)
2. Measure width of valley at this elevation and compute the surface area in acres (43, 560 square feet per acre).
3. Multiple surface area by 0.4 times maximum water depth in feet. (325,900 gallons in one acre-ft)

DETERMINING WATERSHED SIZE FOR STORAGE

Ponds supplied with surface runoff require adequate watershed size to meet desired depth and storage capacity. Generally in our region every acre-foot of pond storage needs 2 to 2.5 acres of watershed area.

A larger watershed area is needed for ponds built in shallow or flat valleys and smaller watersheds for steeper valleys.

ARE YOU THINKING ABOUT CONSTRUCTING A POND?

If you are intending to build a pond, always consult a **Licensed Engineer** for embankment and spillway design.
For advice or questions regarding planning and maintenance contact the Culpeper SWCD or the Natural Resource Conservation Service (NRCS) at (540) 825-4200.

Questions of zoning and setbacks contact your County's Planning and Zoning Department.

Culpeper County
Planning & Zoning: (540) 727-3404
ACOE (540)764-4459

Greene County
Planning & Zoning (434) 985-5282
ACOE (434) 973-0568

Madison County
Zoning Administration (540) 948-6102
ACOE (540) 764-4459

Orange County
Planning & Zoning: (540) 672-4347
ACOE (804) 212-6817

Rappahannock County
Zoning Administration (540) 675-5330
ACOE (540) 764-4459

Culpeper Soil and Water Conservation District

351 Lakeside Drive
Culpeper, Va. 22701
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Orange (540) 308-6301
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Madison (540) 948-7531
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https://www.facebook.com/CulpeperSoilandWater

CULPEPER SOIL AND WATER CONSERVATION DISTRICT

SERVING CULPEPER, GREENE, MADISON, ORANGE, AND RAPPAHANNOCK

Pond Planning!

A Landowner's Guide to Ponds

A Typical Earthen Pond at Cedar Springs Dairy in Madison.

PONDS

A pond may be constructed for a variety of uses such as recreation, fire suppression and agricultural/fish production. Ponds should always be designed by a **Licensed Engineer** to insure safety and longevity. This brochure is intended as a guide to landowners for permitting and planning.

PERMITS

There are three types of permits for building or improving a pond.

1. Land-Disturbing Permits
Land-disturbing greater than 10,000 sq. ft. for access roads, borrow pits, and grading. Agricultural ponds used for watering crops and livestock may be exempt from land-disturbing permits issued by the County. Contact your County Zoning Department.

2. Wetland and Stream Impacts
Please contact the Army Corp of Engineers (ACOE) and Virginia Department of Environmental Quality (DEQ).

3. Dam Safety (call: 804- 371- 6095)
Ponds with a dam 25 feet or greater in height and with an impoundment capacity of more than 15 acre-feet, and ponds with a dam 6 feet or greater in height and with an impoundment capacity of more than 50 acre-feet are regulated by the Department of Conservation and Recreation, Division of Dam Safety. Under these regulations, ponds require an operating permit, annual inspections and development of an emergency action plan.

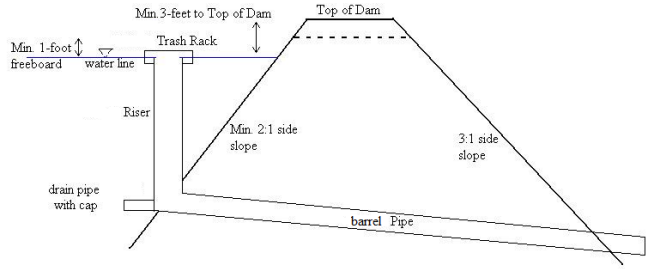
UNDERSTANDING PONDS

There are two types of pond construction:

1. Embankment ponds
A pond formed by the construction of a dam across a stream or watercourse.
2. Excavated Ponds
A hole dug out of nearly level ground. These ponds are more expensive and can only accommodate a small supply of water.

Both designs require a source of water either from a spring, live water course or surface runoff.

Typical Pond Configuration:



Riser should be 1.2 diameter of pipe
Trash Rack should be 1.5 Riser diameter

WATER NEEDS

The amount of designed water storage is determined by the intended use of the pond.

Livestock watering:

Horses	20 gal/head/day
Beef/Dairy (drinking)	20 gal/head/day
Dairy Operations	35 gal/head/day
Hogs	4 gal/head/day
Sheep	2 gal/head/day

Irrigation:
Consult your local Extension Office.

Fire Suppression:
The amount needed is at least ¼ acre-feet of storage.

CHOOSING A SITE

The pond site selection needs to consider adequate water supply, type of watershed, topography and soils.

There should be adequate water supply to handle all of your needs. Factors that influence water supply include base-flow of the stream/spring, rainfall, evaporation and watershed size and characteristics.

The watershed can determine the quality of your water supply. An urban watershed may have more impacts on water quality than a predominantly rural or forested watershed and can supply more runoff.

Topography determines the length of the permanent pool and height of the dam. Steep side slopes and high grade changes can affect construction and use of the pond.

Good soil quality is needed for an adequate embankment. The soil needs 20 percent clay to provide proper compaction and prevent seepage through the embankment. Consult a soils scientist or geotechnical engineer for more information or visit www.websoilsurvey.nrcs.usda.gov to develop a soils map of your site.

Pond Resources

General Management :
https://dwr.virginia.gov/fishing/private-pond-management/

Extension Publications:

Stocking Sportfish in Virginia Ponds: Methods and Commercial Supply Sources
https://pubs.ext.vt.edu/420/420-009/420-009.html

Control Methods For Aquatic Plants in Ponds and Lakes
https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/420/420-251/420-251_pdf.pdf

Aquatic Habitats https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/420/420-522/CNRE-79.pdf

Clearing Muddy Pond Waters
https://www.pubs.ext.vt.edu/content/dam/pubs_ext_vt_edu/420/420-250/420-250_pdf.pdf

Technical Resources:

NRCS Pond Sealing or Lining Bentonite Treatment
https://efotg.sc.egov.usda.gov/references/public/VA/521C_VA_Standard_Pond_Sealing_Bentonite_Treatment_Oct_2011.pdf

NRCS Pond Sealing or Lining Soil Dispersant
https://efotg.sc.egov.usda.gov/references/public/VA/521B_VA_Standard_Pond_Sealing_Soil_Dispersant_Oct_2011.pdf

NRCS Pond Sealing or Lining – Flexible Membrane
https://efotg.sc.egov.usda.gov/references/public/VA/VA_521A_Standard_Oct_2012.pdf

NRCS Pond Sealing or Lining – Compacted Clay
https://efotg.sc.egov.usda.gov/references/public/VA/521D_VA_Standard_Compacted_Clay_Treatment_Oct_2011.pdf

NRCS Pond Standard
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1046898.pdf

NRCS Pond Construction
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_030362.pdf