



Governor Dave Freudenthal casts a line into Luckey Pond designed by the Natural Resources Conservation Service on the grounds of the Wyoming State Training School near Lander

TO BUILD A POND IN WYOMING

By Mark Optiz

There are a number of reasons to build a pond. It may be for livestock water or to provide extra water for a garden, lawn, or a few acres of grass. You may want a fish pond or water to attract wildlife, or maybe just a pond for water recreation. If certain your pond project is geologically and hydrologically feasible, you'll need to visit the local Wyoming State Engineer's Office to file the necessary water right applications.

The first prerequisite to having a pond is having a suitable site and adequate supply of water, either from a stream or groundwater. The topography will largely determine if there is a good location and available water source. Depending upon site properties, two types of pond construction are possible: an **excavated pond** and a small **embankment pond** (a bank, mound, dike, or the like, raised to hold back water).

Excavated pond

An excavated pond is dependent upon a very shallow groundwater table or some source of supplemental water. An excavated pond can be built in any shape to fit into a landscape. Generally, an excavated pond for livestock water is rectangular, and one side of the pond is constructed at a relatively flat slope to allow livestock access. Spoil material from the excavation can be mounded close to the pond or can be spread around the pond to blend into the adjoining landscape. The disturbed soils should be seeded and the pond fenced to exclude livestock, except at access locations.

Embankment pond

An embankment pond captures surface water and usually consists of a constructed dam with a minimum top width of 10 feet and side slopes of 3:1 (3 feet horizontal to 1-foot vertical drop) on the pond side and 2:1 (2 feet horizontal to 1-foot vertical drop) on the downstream side of the embankment. An embankment pond should have an emergency or auxiliary spillway constructed on either side of the earthfill embankment to allow storm flows to bypass the pond without overtopping the embankment. Many embankment ponds may also need a pipe spillway to pass excess water from smaller storms and to manage the water depth in the pond. Embankment ponds are generally suited best for locations in natural drainages with at least some periodic flow.

Soils

The soil or bedrock under the pond is very important to assure the pond will retain water. Contacting a Natural Resources Conservation Service (NCRS) office in your area may be beneficial in determining whether the soils can retain the water without much seepage. If seepage is excessive, imported soils, possibly bentonite, may be needed to seal the pond.

Hydrology

If the pond will rely on surface water, the drainage area must be large enough to supply the desired water depth even in times of drought. In the more arid regions of Wyoming, 60 to 80 acres of drainage area may be required to provide one acre-foot of runoff for a pond. One acre-foot is one acre 1-foot deep of water. But don't build a pond in a

location with a very large drainage area where storms could overtop an embankment pond or fill in an excavated pond with sediment. The storage volume for the pond need not be any larger than the volume of anticipated runoff plus some storage to allow for sediment.

Hydraulics

The emergency spillway for an embankment pond will generally need to be large enough to pass a large storm that occurs infrequently, which may be characterized as a 25-year, 24-hour event, or larger. The pipe spillway generally needs to be sized to carry a high frequency, smaller storm event, which is characterized as a two-year, 24-hour event. In Wyoming, in semiarid areas where ponds are on small drainages, both the emergency spillway and the pipe spillway are easily constructed. The emergency spillway is generally an excavated spillway planted with a suitable grass to prevent erosion. The pipe spillway can be constructed from any number of materials, such as corrugated metal, PVC, PE (polyethylene), welded steel, or concrete.

Construction

The excavated pond is generally constructed using a scraper or bulldozer for dry excavation and a dragline for wet excavation. A grader may be needed to shape the spoil material.

Embankment ponds are generally constructed using a scraper, dozer, farm tractor, and grader. The foundation should be excavated to remove sod and to construct a core trench. The core trench is constructed to reduce seepage beneath the embankment. The sod should be stockpiled to place on the finished embankment as topsoil. The embankment should be constructed in shallow lifts of soil and compacted using the earth-hauling equipment or a roller compactor. The soil used to construct the embankment should have suitable moisture to provide a well-compacted earthfill. The embankment should be finished with a grader to provide a neat looking embankment. After the topsoil is placed on the embankment, all of the disturbed areas, including the embankment and borrow areas, should be seeded. The pipe spillway should be installed after the foundation backfill has been completed. The backfill around the pipe spillway should be compacted to prevent seepage along the pipe.

Permits

After the pond plan is completed, all of the necessary local, state, and federal permits required to build a pond



An embankment pond with a vegetative slope.

in Wyoming are needed. A surface water pond requires a permit to construct from the Wyoming State Engineer's Office. Contact the Wyoming State Engineer's Office to obtain an application for the permit. Contact information is at <http://seo.state.wy.us>.

If the pond includes placing earthfill in a wetland, authorization may be needed from the U.S. Army Corps of Engineers prior to construction. Contact the Cheyenne office to find out the steps for its authorization. Contact

information is at <https://www.nwo.usace.army.mil/html/od-rwy/Wyoming.htm>.

Technical help

Obviously, there are a number of tasks associated with pond feasibility, engineering, and construction that require sophisticated expertise. There are many references available to help with the planning, design, and construction of small ponds. One of these references is available from the NRCS: *Ponds – Planning, Design, Construction (Agricultural Handbook Number 590)*. Staff at local NRCS offices in your county are also available to assist with planning, designing, and the construction of your pond. Contact information is available on the Web at www.wy.nrcs.usda.gov/wymaps/wycomap.html.



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