

Dam, Floodwater Retarding (number and acre-feet)

Definition

A single-purpose dam designed for temporary storage of floodwater and for its controlled release.

Scope

This standard covers dams constructed to retard floodwater.

Purpose

To reduce flood damages downstream by controlling the release rate from flood flows of predetermined frequencies. They may also permit the use of more economical channel modifications or stabilizing structures in the channel downstream and reduce environmental hazards and pollution.

Conditions where practice applies

The practice applies only to sites meeting all the following conditions:

1. Topographic, geologic, and soils conditions at the proposed site are satisfactory for the development of a feasible dam and reservoir.
2. The sediment yield at the site is not excessive.

Special attention shall be given to maintaining habitat for fish and wildlife if applicable.

Planning considerations

Water Quantity

1. Reductions in downstream flow during runoff periods.
2. Potential total runoff or decrease of evaporation from the reservoir surface and seepage from the pool bottom.
3. Potential increases in surface water volume during normal low flow periods caused by prolonged duration of reservoir releases.

4. Increase in deep percolation to the ground water resulting from seepage from the reservoir sides and bottom. The amount of seepage will depend on soils, area covered by the reservoir, and length of time inundated, and measures for reservoir sealing.

Water Quality

1. Potential for improving downstream surface water quality resulting from trapping of suspended sediments, bedload material, and associated nutrients and pesticides in the pool area.
2. Instability of downstream banks and channel and their potential to deepen and widen.
3. Potential for degradation of surface water quality by sediments, fuels, oils, and other chemicals during construction.
4. Increase in temperature, decrease in dissolved oxygen, and the amount of adsorbed nutrients and pesticides in deposited sediments in sediment pools.
5. Potential changes in downstream water temperatures and dissolved oxygen content that could result from the design of the outlet structure. Where dissolved oxygen may be reduced by outlet placement, plan some means of causing rapid dissolved oxygen recovery.
6. Increases in soluble nutrients and pesticides in deep percolating waters caused by seepage in reservoir sides and bottom. Chemicals may originate from those used in the structure and reservoir area, or may be dissolved in waters from the watershed area.

Design Criteria

All dams designed under this standard shall meet or exceed the criteria as called for in the standard for ponds (378) or in TR-60, as appropriate, except as specifically modified by this standard.

The capacity of the principal spillway shall be adequate to discharge, in 10 days or less, the floodwater storage needed to provide the desired level of protection to the downstream benefited area. Storage provided primarily for the purpose of reducing the frequency of use of the emergency spillway need not be included in this 10-day drawdown limitation. The determination of capacity must be based on consideration of the benefits that accrue to the reduction in the discharge rate, damages that may result from prolonged storage in the retarding pool, damages that may result from prolonged outflow, the limitations in water rights or other legal requirements. Longer release times may be used if warranted by downstream conditions. The discharge through gated outlets shall not be considered in determining the emptying time of the retarding pool.

The elevation of the crest of the lowest stage of the principal spillway shall be set at the elevation of the sediment pool. For dry dams, the riser shall be designed to permit design discharge at the sediment pool elevation with provisions for discharging water at lower elevations to satisfy the functional requirements of the structure.

All parts of the principal spillway, except attached gates and trash racks, shall have an expected service life equal to or greater than the design life of the structure or provisions made for replacement. Principal spillways shall meet the requirements with respect to materials established in the standard for ponds (378) or in TR-60, as appropriate.

The minimum diameter of the conduit used as a principal spillway shall be 10 in.

The storage volume shall not be less than the expected sediment accumulation during a period equal to the design life.

The retarding storage requirements shall be of such as to contain the runoff expected to occur at a frequency consistent with the level of protection to be provided to the downstream benefited area, with proper allowance for discharge through the principal spillway. The retarding storage capacity shall be sufficient to limit the use of the emergency spillway to a permissible frequency and duration based upon consideration of the erosion resistance of the spillway material and vegetative protection to be provided.

Plans and specifications

Plans and specifications for installing floodwater retarding dams shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.