

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

IRRIGATION STORAGE RESERVOIR

(No. and acre-ft)
CODE 436

DEFINITION

An irrigation water storage structure made by constructing a dam.

Scope

This standard applies to irrigation water storage structures designed to be filled during the season of low irrigation demand to provide water needed for irrigation during some other part of the year or in some future year. It does not apply to structures designed primarily for flow control or those designed to store water for only a few hours or a few days.

This standard pertains to the planning and functional design of irrigation storage reservoirs. It does not include detailed design criteria or construction specifications for individual structures or components of the storage facility.

PURPOSES

To conserve water by holding it in storage until it can be beneficially used to meet crop irrigation requirements.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies only to sites meeting all the following criteria:

1. The water supply available to the irrigated area is insufficient to meet conservation irrigation requirements during part or all the conservation season.
2. Water is available for storage from surface runoff streamflow, or a subsurface source during periods of low or non-irrigation use.
3. Topographic, geologic, and soils conditions are satisfactory at some suitable site for constructing and economically feasible storage reservoir.

CRITERIA

Irrigation

The amount of water required to properly irrigate the crops in the area to be irrigated and the variations in water demand within the growing season must be known to adequately evaluate storage requirements. All demand hydrographs shall be computed from the consumptive use-time relationship, increased to reflect the anticipated level of farm irrigation efficiency plus any losses to be expected in conveying the water from the point of diversion to the farm and field. If water is required for such purposes as leaching of frost control, the amount needed shall be included in the demand hydrograph.

Storage

Irrigation storage reservoirs shall be designed to have a usable capacity sufficient to satisfy irrigation requirements in the design area, unless limited by characteristics of the reservoir site or by the available watershed yield (including limitations imposed by water rights.) Additional capacity shall be provided as needed for sediment storage.

The stored water releases required to meet irrigation demands shall be those increments of the water demand hydrograph that exceed the available direct flows from other sources.

Capacity

In computing the reservoir capacity required to satisfy irrigation demands, due consideration shall be given to the length of the storage period, the anticipated inflow during this period, and the seepage and evaporation losses to be expected under the proposed plan of operation.

If the storage capacity is limited by the characteristics of the site to less than that required to meet the irrigation demands of the proposed area or if the water supply available for storage is insufficient to meet these demands, the quantity of water that can be made

available at the reservoir outlet and the acreage that can adequately be irrigated shall be computed as a means of evaluating the benefits of the proposed installation. The benefits may be evaluated on the basis of the more frequent availability of water to satisfy irrigation demands for the full design area.

Type of structures

The type of dam and appurtenant structures to be used shall be selected for each site on the basis of hydrologic studies and engineering and geologic investigations of the site conditions and the materials available for construction.

The reservoir may be created by an impounding embankment used to intercept surface runoff or by an enclosed embankment used to store pumped water.

Foundation, embankment, and spillway

Earthen dams and embankments and related appurtenant structures shall be designed to meet the criteria in the standard for ponds (378) or in TR-60, as appropriate.

Drop spillways, chute spillways, and box spillways shall be designed according to the principles set forth in the Engineering Field Manual for Conservation Practices, the National Engineering Handbook, Section 5-Hydraulics; Section 11-Drop Spillways; or Section 14-Chute Spillways, as appropriate.

Overflow protection

An overflow protection structure with a capacity equal to or greater than the inlet stream shall be provided for an enclosed embankment. This structure may be designed and installed in combination with the outlet works.

Outlet works

Outlet works shall be provided for the controlled release of irrigation water. Outlet works may consist of a gated conduit through or over the dam for gravitational flow to the irrigated area or to a pumping plant or they may consist of a pumping plant designed to lift water directly from the reservoir basin.

The capacity of the outlet works shall not be less than that required to provide the outflow rate needed to meet peak period irrigation system demands.

CONSIDERATIONS

Water Quantity

1. Effects on the water budget, especially on volumes and rates of runoff, infiltration, evaporation, transpiration, and deep percolation, and groundwater recharge.
2. Effect on downstream flows or aquifers that would affect other water uses or users.
3. Effects on the volume of downstream flow that could have undesirable environmental, social, or economic effects.
4. Potential use for irrigation water management.

Water Quality

1. Effects on erosion and the movement of sediment and soluble and sediment-attached substances carried by runoff.
2. Effects on the movement of dissolved substance to ground water.
3. Effects on downstream waters that could cause undesirable effects on aquatic and wildlife communities.
4. Short-term and construction-related effects on the quality of downstream water courses.
5. Effects on the temperature of downstream water that could cause undesirable effects on aquatic and wildlife communities.
6. Effects on wetlands or water-related wildlife habitats.
7. Potential for earth -moving to uncover or redistribute toxic materials.
8. Effects on the visual quality of water resources.

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a

listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing irrigation storage reservoirs shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purposes.

OPERATION AND MAINTENANCE

An operation and maintenance plan must be prepared by the Designer for use by the owner or other responsible for operating this practice. The plan should provide specific instructions for operating and maintaining the system to insure that it functions properly. It should also provide for periodic inspections and prompt repair or replacement of damage components.