

Irrigation Storage Reservoir (No. and Ac.-Ft.) 436

DEFINITION

An irrigation water storage structure made by constructing a dam, embankment, or pit.

PURPOSE

Conserve water by holding it in storage until it is used to meet crop irrigation requirements.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to irrigation water storage structures that meet all the following criteria:

1. The water supply available to the irrigated area is insufficient to meet conservation irrigation requirements during part or all of the irrigation season.
2. Water is available for storage from surface runoff, streamflow, or a subsurface source.
3. A suitable site is available for the construction of a storage reservoir.

This standard pertains to the planning and functional design of irrigation storage reservoirs. Storage reservoirs shall be planned and located to serve as an integral part of an irrigation system.

This standard does not apply to NRCS conservation practice standard Irrigation Regulating Reservoir (552) designed primarily for flow control or to store water for a few hours or days. It does not include detailed design criteria or construction specifications for individual structures or components of the storage facility.

CRITERIA

General Criteria Applicable to All Purposes

Irrigation Storage Reservoirs shall be planned, designed, and installed to meet all federal, state, local and tribal laws and regulations.

The criteria for the design of components not addressed in NRCS conservation practice standards shall be consistent with sound engineering principles.

Irrigation. The amount of water required to meet variations in water demand within the growing season must be determined to calculate storage requirements. All demand hydrographs shall be computed from the consumptive use-time relationship. Demand hydrographs shall be adjusted to reflect anticipated irrigation efficiency, conveyance losses, and any other consumptive uses, such as leaching or frost control.

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

Water releases shall be those increments of the water demand hydrograph that exceed the available direct flows from other sources.

Capacity. Reservoir capacity required to satisfy irrigation demands shall be computed according to the length of the storage period, the anticipated inflow, and outflow during this period, and the expected seepage and evaporation losses.

If storage capacity is limited, benefits may be evaluated on the basis of the more frequent availability of water to satisfy irrigation demands for the design area.

Type of structures. The type of dam, embankment, or pit and appurtenant structures shall be based on site-specific hydrologic studies, engineering, geologic investigations, construction materials, and environmental considerations.

Foundation, embankment, and spillway. Earthen dams, embankments, pits and appurtenant structures shall conform to the criteria in the NRCS conservation practice standard Pond (378) or in National Engineering Handbook, Part 628, Dams, (formerly referred to as Technical Release-60, Earth Dams and Reservoirs), as appropriate.

Drop spillways, chute spillways, and box spillways shall be designed according to the principles of National Engineering Handbook, Part 650, Engineering Field Handbook, and the National Engineering Handbook, Part 634, Hydraulic Engineering (formerly referred to as Section 5-Hydraulics; Section 11-Drop Spillways; or Section 14-Chute Spillways), as appropriate.

Overflow protection. Overflow protection shall be provided for enclosed embankments.

Outlet works. Outlet works shall be provided for the controlled withdrawal or release of irrigation water. Outlet works may consist of a direct pumping system, or a gated conduit through or over the dam for gravitational flow to the irrigated area, to a pumping plant or another storage facility.

The capacity of the outlet works shall be sufficient to meet peak period irrigation system demands.

Vegetation. Disturbed areas around Irrigation Storage Reservoirs, embankments, and auxiliary spillways shall be vegetated according to the NRCS conservation practice standard Critical Area Planting (342). Use vegetation adapted to the site that will accomplish the desired purpose. Preference shall be given to native species in order to reduce the introduction of invasive plant species; provide management of existing invasive species; and minimize the economic, ecological, and human health impacts that invasive species may cause. If native plant materials are not adaptable or proven effective for the planned use, then non-native species may be used. Refer to the Field Office Technical Guide, Section II, Invasive Plant Species, for plant materials identified as invasive species.

CONSIDERATIONS

Consider the potential effects of installation and operation of Irrigation Storage Reservoirs on the cultural, archeological, historic, and economic resources.

When planning this practice, the following items should be considered, as applicable:

- Short-term and construction-related effects on the quality of downstream water courses.
- Potential for earth moving during construction to uncover or redistribute toxic materials.

Consider the effects on:

- The water budget, especially on evaporation, transpiration rates of runoff, infiltration, percolation, and ground water recharge.
- Downstream flows or aquifers that would affect other water uses or users.
- The volume of downstream flow that could have undesirable environmental, social, or economic effects.
- Erosion, sediment, soluble contaminants, and contaminants attached to sediment in runoff.
- The movement of dissolved substances to ground water.
- Downstream waters such as water temperature changes that could cause undesirable effects on aquatic and wildlife communities.
- Wetlands or water-related wildlife habitats.
- The visual quality of water resources.

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

Support data documentation requirements are as follows:

- Inventory and evaluation records
 - Assistance notes or special report
- Survey notes, where applicable
 - Design survey
 - Construction layout survey
 - Construction check survey
- Design records
 - Physical data, functional requirements and site constraints, where applicable
 - Soils/subsurface investigation report, where applicable
- Design and quantity calculations
- Construction drawings/specifications with:

- Location map
- “Designed by” and “Checked by” names or initials
- Approval signature
- Job class designation
- Initials from preconstruction conference
- As-built notes
- Construction inspection records
 - Assistance notes or separate inspection records
 - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable.

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be developed for this practice. The O&M plan shall be consistent with the purposes of the practice, its intended life, safety requirements, and the criteria for the design.