

NATURAL RESOURCES CONSERVATION SERVICE  
CONSERVATION PRACTICE STANDARD

IRRIGATION SYSTEM, TAILWATER RECOVERY

(No.)  
Code 447



**DEFINITION**

A planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tailwater and/or rainfall runoff have been installed for reuse.

**PURPOSE**

This practice may be applied as part of a conservation management system to support one or more of the following:

- Conserve irrigation water supplies
- Improve offsite water quality

**CONDITIONS WHERE PRACTICE APPLIES**

Tailwater recovery systems are suitable for use on lands and facilities served by properly designed and installed irrigation systems where recoverable irrigation runoff and/or rainfall runoff flows can be anticipated under current or expected management practices.

This standard applies to the planning and functional design of irrigation tailwater recovery systems including, but not limited to, pickup ditches, sumps, collecting basins or reservoirs, and pipelines. It does not apply to detailed

design criteria or construction specifications for individual structures or components of the recovery system.

**CRITERIA**

**General Criteria Applicable To All Purposes**

The installation and operation of a tailwater recovery system shall comply with all Federal, state and local laws, rules and regulations.

Design and construct facilities needed for a tailwater recovery system according to appropriate NRCS standards and specifications. The criteria for the design of components not addressed in a NRCS conservation practice standard shall be consistent with sound engineering principles.

**Collection facilities.** Facilities for the collection of irrigation tailwater can be an integral part of irrigation systems covered by Florida NRCS conservation practice standards Irrigation System, Sprinkler, Code 442 and Irrigation System, Surface and Subsurface, Code 443. These facilities may include, but are not limited to ditches, culverts, pipelines, water control and/or grade stabilization structures or other erosion control measures, as needed.

**Storage facilities.** Facilities are needed to store the collected water until it is redistributed through the irrigation system. In determining the size of the storage facility, consider runoff volume and rate, as well as the required level of water control at the point where the tailwater is returned to the irrigation system.

Small sumps with frequently cycling pumping plants may be used for systems where tailwater is discharged into a collecting basin or irrigation regulating reservoir (Florida NRCS conservation practice standard Irrigation Regulating

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Reservoir, Code 552), or into a pipeline having facilities for regulating fluctuating flows (i.e. a float valve). For systems unable to regulate flows, size tailwater sumps or reservoirs large enough to provide the regulation needed to permit efficient use of the water.

When energy sources for tailwater systems are subject to interruption, safe emergency bypass areas cannot be provided, or tailwater discharges violate local or state regulations, tailwater storage requirements shall, as a minimum, include a volume adequate to store the entire runoff from a single irrigation cycle.

Equip sumps and reservoirs with inlets designed to protect the side slopes and the collection facilities from erosion. Provide a dike, ditch, water control structure or other structure if needed, to limit the entrance of rainfall runoff into the designed inlet. Install sediment traps as needed.

**Conveyance facilities.** All tailwater recovery systems require facilities to convey reuse water from the storage facility to a point of entry back into the irrigation system. These facilities may consist of a pumping plant and pipeline to return the water to the upper end of the field, or a gravity outlet having a ditch or pipeline to convey the water to a lower elevation in the irrigation system. Other components or combinations of components may be necessary as determined on a site-specific basis.

Determine the capacity of conveyance facilities by an analysis of the expected runoff rate, the planned collecting basin or irrigation regulating reservoir storage capacity, and the anticipated irrigation application. If the return flow is used as an independent irrigation supply rather than as a supplement to the primary irrigation water supply, the rate and volume of flow must be adequate for the method(s) of water application employed.

#### **Additional Criteria Applicable To Improving Water Quality**

**Storage facilities.** Where additional storage is required, size storage facilities to provide adequate retention time for the breakdown, assimilation, deposition, or treatment of nutrients or other chemicals in the runoff waters. Allowable retention times shall be site specific to

the particular nutrient(s) or chemical(s) being used.

Control seepage from a storage facility to the extent possible when the storage facility is expected to receive nutrient or chemical-laden waters. Control may be in the form of natural soil liners, soil additives, commercial liners, or other approved methods.

Size storage facilities accordingly, where additional storage is required for sediment deposition. Allowable retention times shall be site specific to the particular soil type(s).

### **CONSIDERATIONS**

#### **Water Quantity**

- Design irrigation systems to limit tailwater volumes that are needed for effective operation. This reduces the need for and/or minimizes the required size and capacity of collection, storage, and transportation facilities.
- Where tailwater recovery systems are used to collect rainfall runoff for storage and use as an irrigation water source, the size and capacity of collection and storage facilities will be sized according to expected runoff volumes and rates as well as the expected crop water needs.
- Changes in irrigation water management activities may be necessary to optimize the use of return flows.
- Downstream flows or aquifer recharge volumes dependent on runoff will be reduced and could cause undesirable environmental, social, or economic benefits. Existing wetland hydrology could be impacted by this practice.

#### **Water Quality**

- Plan nutrient and pest management measures to limit nutrient or chemical-laden tailwater as much as practical. Effects on surface and groundwater quality by the movement of sediment and soluble and sediment – attached substances should be considered. Nutrient or chemical-laden water can create a potential hazard to wildlife, especially waterfowl that are drawn to ponded water.

- Give consideration to monitoring of irrigation reuse water for weed seed, harmful bacteria, salinity, and disease. Take necessary steps to prevent spreading of these problems
- Consider protection of system components from storm events and excessive sedimentation.

#### Other Considerations

- This practice may adversely affect cultural resources and must comply with NRCS General Manual (GM) 420, Part 401 during planning, installation, and maintenance.
- Effects on the visual quality of water resources should also be considered.

#### PLANS AND SPECIFICATIONS

Prepare plans and specifications for irrigation tailwater recovery systems for specific field sites in accordance with this standard and describe the requirements for applying the practice to achieve its intended purpose. As a minimum, include the following in the plans and specifications:

- Site plan layout of the tailwater recovery pond and associated structures,
- Cross sections and profiles,
- Type, quality, and quantity of the various system components, and
- Location of utilities and notification requirements.

#### OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan specific to the irrigation tailwater recovery facilities for use by the landowner or operator responsible for the operation and maintenance. The O&M plan shall provide specific instructions for operating and maintaining facilities to ensure they function properly. As a minimum, include provisions to address the following in the O&M plan:

- Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality.
- Periodic checks and removal of debris as necessary from trash racks and structures to assure proper operation.
- Periodic removal of sediment from traps and/or storage facilities to maintain design capacity and efficiency.
- Inspection or testing of all pipeline and pumping plant components and appurtenances, as applicable.
- Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.

#### REFERENCES

Florida NRCS Conservation Practice Standards  
Irrigation Regulating Reservoir, Code 552  
Irrigation System, Sprinkler, Code 442  
Irrigation System, Surface and Subsurface,  
Code 443

GM 420, Part 401