

Pumping Plant (No.) 533

DEFINITION

A pumping facility installed to transfer water for a conservation need.

PURPOSE

Provide a dependable water source or disposal facility for water management.

CONDITIONS WHERE PRACTICE APPLIES

Wherever water must be pumped to accomplish a conservation objective, which may include, but is not limited to, one of the following:

- To provide a water supply for such purposes as irrigation, recreation, livestock, or wildlife.
- To maintain critical water levels in swamps, marshes, open water, or for newly constructed wetlands and ponds.
- To provide drainage by the removal of surface runoff water or groundwater.
- To transfer wastewater for utilization as part of a waste management system.

CRITERIA

Design, installation, and operation of a pumping plant shall comply with all federal, state, local, and tribal laws, rules, and regulations.

The efficiency of units, type of power, quality of building, automation, and other accessories installed shall be in keeping with the economic and environmental value of the system to accomplish the conservation objectives.

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

Pump requirements. The capabilities, range of operating heads, and general class and efficiency of equipment shall be determined from appropriate technical means. Size and number of pumps and their performance shall be determined on the basis of system conservation requirements in order to meet the intended purpose. Total head shall be determined for critical operating conditions, taking into account all hydraulic losses. Automatic controls shall be included in the plans as required.

Pumps utilized for the transfer of wastewater or manure shall be sized to transfer material at the required system head and flow rate determined by the Comprehensive Nutrient Management Plan. The pump type shall be based on the consistency of material being pumped and manufacturer's recommendations.

Power units. Power units shall be selected on the basis of availability of fuel or power, costs, operating conditions, conservation needs and objectives, including the need for automation. The power unit shall be matched to the pump and be capable of operating the pump efficiently and effectively within the range of operating conditions. The horsepower requirements, pump efficiency, and total head on the pump shall be computed.

Suction and discharge pipes. The size of suction and discharge pipes shall be based on a hydraulic analysis, operating cost, and compatibility with other system components. The arrangement and length of discharge pipe shall be based on the need for recovery of head through siphoning action, and for delivery of water in keeping with conservation and environmental objectives. Gates, valves, pipe connections, discharge bays, and other protective devices shall be installed, as needed, for satisfactory pumping plant operation.

Building and accessories. The design of the pumping plant and associated housing, if required, shall consider accessibility for equipment maintenance and repairs and the need for protecting equipment from the elements, vandalism, and fire. The appearance of the plant shall be compatible with the surrounding environment, as applicable.

Foundations shall be designed to safely support the loads imposed. Sheet piling or other measures shall be used, as required, to prevent piping beneath the foundation.

Pumps may be mounted in the open, on piling, concrete foundations, in a well or pit, or by other appropriate means.

Suction bays (or sumps) shall be designed to conform to the hydraulic characteristics established by the pump manufacturer.

The discharge bay or connection with the distribution system shall meet hydraulic and structural requirements. Provisions for repair or removal of pumps and power units shall be provided. Trash racks shall be provided, as needed, to exclude debris and trash from the pump.

All structural features and equipment shall provide adequate safety features to protect workers and the public from injury.

Minimize adverse effects on surface and ground water by fuels and lubricants by siting of the pumping plant, use of containment, and use of impermeable surfaces, where appropriate.

CONSIDERATIONS

Consider the potential effects of installation and operation of pumping plants on cultural, archaeological, historic and economic resources.

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

- *Effects on downstream flows or aquifer recharge volumes.*
- *Effects on existing wetland hydrology.*
- *Effects on surface and ground water by leaked or spilled fuels and lubricants.*
- *Secondary containment of spilled fuel for water quality as may be required by federal and state laws or regulations.*
- *Protection of system components from "natural" events such as floods.*

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
 - Conservation 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
 - Conservation Assistance notes or separate inspection records
 - Construction approval signature
- Record of any variances approved
- Record of approvals of in-field changes affecting function and/or job class

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.