

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

PUMPING PLANT

CODE 533
(Reported by No.)

DEFINITION

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

PURPOSES

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 transfer wastewater for utilization as part of a waste management system.
- To provide drainage by the removal of surface runoff or groundwater.

CONSIDERATIONS

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 groundwater 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.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

CRITERIA

Criteria Applicable to All Purposes

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

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

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

Pump Requirements. Capabilities, range of operating heads, and general class and efficiency of equipment shall be determined by appropriate technical means. Size and number of pumps and

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

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 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 waste 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.

Federal, state, and local laws and regulations concerning back flow prevention shall be followed when pumping from wells or when chemigating.

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 or 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 engines 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.

SPECIFICATIONS

Plans and specifications for establishing of this practice shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail to ensure success of the practice. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be prepared for each management unit. The plan shall provide specific instructions for operating and maintaining the system to insure that it functions properly. Appropriate job sheet(s), fact sheets, or other information sheets may be used to serve as the management plan as well as supporting documentation and shall be provided to the client. These sheets shall be referenced in the conservation plan narrative.

The plan shall include provisions to address the following, as a minimum:

1. Inspection or testing of all pumping plant components and appurtenances, as applicable.
2. Proper start-up procedures for the operation of the pumping plant.

3. Routine maintenance of all mechanical components (power unit, pump, drive train, etc.) in accordance with the manufacturer's recommendations.
4. When applicable, the power unit, fuel storage facilities and fuel lines should be frequently checked for fuel or lubricant leaks and repaired as needed.
5. Periodic checks and removal of debris as necessary from trash racks and structures to assure adequate capacity reaches the pumping plant.
6. Periodic removal of sediment in suction bays to maintain design capacity and efficiency.
7. Inspect and maintain anti-siphon devices, if applicable.
8. Routinely test and inspect all automation components of the pumping plant to assure they are functioning as designed.
9. Inspect and maintain secondary containment facilities, if applicable.
10. Periodic inspection of all safety features to ensure they are in place and functional.
11. Prior to retrofitting any electrically powered equipment, electrical service must be disconnected and the absence of stray electrical current verified.

SUPPORTING DATA AND DOCUMENTATION

The following is a list of the minimum data and documentation to be recorded in the case file:

1. Extent of planting in acres, field number, and the location of the practice marked on the conservation plan map;
2. Assistance notes shall include dates of site visits, name or initials of the person who made the visit, specifics as to alternatives discussed, decisions made, and by whom;
3. Completed copy of the appropriate job sheet(s) or other specifications and operation and management plan.

Field Data and Survey Notes

The following is a list of the minimum data needed:

1. Plan view sketch of the area.
2. Establish and describe a temporary benchmark.
3. Elevations of the water surface at the intake and the elevation of the pump.
4. If the pump is to have float activated off-on switches, determine the appropriate elevations for the settings.
5. Distance from the pump to the discharge end.
6. The discharge pipe material and diameter.
7. The consistency of the material being pumped.
8. Location and elevation of soil borings.

Design Data

Record on appropriate engineering paper. For guidance on the preparation of engineering plans see Chapter 5 of the Engineering Field Handbook - Part 650. The following is a list of the minimum required design data:

1. Locate the practice on the farm plan map in the case file.
2. Determine the required pumping capacity.
3. Determine the range of operating heads.
4. Compute friction head loss and other hydraulic head losses.
5. Select the pump based on the suction head and total discharge head required, the material consistency and the required capacity. (Refer to the manufacturer's recommendations.)
6. Match the power unit to the pump based on the available power source, the pumping horsepower needed, and the total head.

(Refer to the manufacturer's recommendations.)

7. Provide details for the pump shelter and foundation, as appropriate.
8. Provide for the control of erosion at the discharge end of the pumping plant.
9. State the elevations at which to set the automatic off-on switches, if utilized.
10. Show job class on the plan.

Construction Check Data/As-Built Plans

Record on survey notepaper, NRCS-ENG-28, or other appropriate engineering paper. Survey data will be plotted in red on the as-built plans. The following is a list of minimum data needed for As-built documentation:

1. Documentation of site visits on CPA-6. The documentation shall include the date, who performed the inspection, specifics as to what was inspected, all alternatives discussed, and decisions made and by whom.
2. Pump manufacturer's specifications, certifications, and dimensions.
3. Power unit manufacturer's specifications, certifications, and dimensions.
4. As-built foundation details.
5. Safety features and devices.
6. Appurtenances used - manufacturer.
7. Type and location of fencing and safety features where appropriate.
8. Final quantities and documentations for quantity changes. Materials certifications as appropriate.
9. Sign and date check-notes and plans by someone with appropriate approval authority. Include statement that practice meets or exceeds plans and NRCS practice standards.