

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PUMPING PLANT

(No.)

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

CRITERIA

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

The owner/operator shall be responsible for securing all required permits and approvals and for performing all planned work in accordance with such laws and regulations. NRCS employees are not to assume responsibility for procuring permits, rights,

or approvals, or for enforcing laws and regulations. NRCS may provide the landowner or operator with technical information used for obtaining the required permits, rights or approvals to construct, operate, and maintain the practice.

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 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.

Wastewater Pumps: 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.

Irrigation Pumps: ***Pumps utilized for irrigation systems, shall document the maximum anticipated daily irrigation water volume, the required rate (GPM) and total***

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Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service **State Office** or visit the **electronic Field Office Technical Guide (e-FOTG)** located on our web site. **Note: Bold italics is information added or changes made to the National Conservation Standard by WV.**

head (PSI). The pumping rate shall supply a minimum of 125% of the required irrigation rate (GPM). A moderate to high volume well can typically pump water 12 to 14 hours day without significant drawdown. Minimum and low volume wells can easily be depleted if over pumped. To protect the well from excessive drawdown, especially during drought periods, an allowable number of hours/day the pump can withdraw water can be determined. This will yield the anticipated design water volume (Gallons), from the well, that the irrigation design can rely on.

To determine the daily volume (Gallons/day) of water the well will produce, multiply the Estimated Well Yield (GPM) X 80% X the allowable number of minutes/day the pump is in use. Reference the table below:

MAX. ALLOWABLE NUMBER OF HOURS PER DAY IRRIGATION WELL IN USE.					
80% OF ESTIMATED WELL YIELD* (GPM)	<5	5 to <8	8- <16	16- <20	>20
ALLOWABLE PUMPING HOURS/DAY	4	6	8	10	14
MINUTES/DAY	240	360	480	600	840

* ESTIMATED WELL YIELD as documented by the State of WV Water well completion report*or a certified Yield and Drawdown Test as documented on the State of WV Water Well Completion Report.

Above Ground or Buried Storage Tanks

IF the well pump cannot produce the required rate of discharge required for design, but the well can meet the daily demands of the system as described above, a storage tank can be installed as part of the pumping plant. Referenced CP Water Harvesting Catchment (636) for guidelines on above or below ground water holding storage tanks. In no case, shall the storage tank(s) be less than 1200 gallons.

Alternative Energy Pumps: Windmills, solar pump, nose pumps, ram pumps and other energy savings pumps are design specific. Contact a reputable supplier for the best source of information. Minimum

information required for the design will be the pump head (suction and discharge), water quality, location, required flow rate (GPM), float switches, photovoltaic mounts, battery back up (as needed) lightning arrestors, check valves, water quality, water velocity, etc.

Refer to the WVENGWS553-B Pumping System Design Information.

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, **filters**, 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 chernigating.

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.

- When applicable, the power unit, fuel storage facilities and fuel lines should be frequently checked for fuel or lubricant leaks and repaired as needed.
- Periodic checks and removal of debris as necessary from trash racks and structures to assure adequate capacity reaches the pumping plant.
- Periodic removal of sediment in suction bays to maintain design capacity and efficiency.
- Inspect and maintain anti-siphon devices, if applicable.
- Routinely test and inspect all automation components of the pumping plant to assure they are functioning as designed.
- Inspect and maintain secondary containment facilities, if applicable.
- Periodic inspection of all safety features to ensure they are in place and functional.
- Prior to retrofitting any electrically powered equipment, electrical service must be disconnected and the absence of stray electrical current verified.

References:

Chapters 1 and 14, Engineering Field Handbook and Chapters 7 and 8,

Section 15, National Engineering Handbook, Chapter 15 Irrigation Pumping Plants

Irrigation Pumps and Alternate Water Sources

<http://www.JessStryker.com/spklr.htm>