

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PUMPED WELL DRAIN

(No.)

CODE 532

DEFINITION

A well sunk into an aquifer from which water is pumped to lower the prevailing water table.

SCOPE

This standard applies to drilled or driven wells used for pumping ground water to lower the water table level in a given area. It does not apply to vertical drains, sometimes called drainage wells, constructed to discharge drain effluent into porous underground formations. Pumps, motors, or other appurtenances needed to pump water from the aquifers are not included.

This standard does not apply to test wells established for investigating purposes before the installation of a permanent well because they are considered temporary.

PURPOSE

To provide subsurface drainage by lowering the prevailing water table to a level that will provide minimum benefits to crop or soils by removing excess ground water and/or salts from the soil profile.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to areas that have a high water table and are in need of subsurface drainage, where pumping from wells is feasible. This requires a permeable aquifer at a depth and of such thickness and magnitude

that, when pumped, will lower the water table to the desired degree.

An adequate outlet for the pumped drain water, considering its quantity and quality, must be available.

DESIGN CRITERIA

Quantity of water. The amount of ground water to be pumped from the well or wells shall be that required to provide the desired drawdown in the area being drained.

The area served by each well should be based upon a minimum sustained yield of 2 gpm. The minimum output of the system shall be at least 1.5 gallons per minute per acre served.

Multiple well drains. If more than one well is used in the system, the cones of depression developed by each shall overlap to such an extent that the points of least drawdown will be at the desired level after drainage.

Pipe manifold systems should have a rising grade to the pump for best system performance.

Multiple wells connected by a manifold and operated by a single pump should have a valve installed between the manifold line and the individual well. The valve will permit individual control of well operation. Should the need arise, one can completely stop operation of a selected well. This provides

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

a means for balancing the suction head, if necessary, to enhance the discharge of the more remote wells.

Either a clear sight-glass (four-inch minimum length) or a connection for measuring suction pressure should be provided between the valve discussed above and the individual well being pumped. This will allow one to check individual well performance as may be required.

Submersible pumps may be used in individual wells with the well outlet being connected to a common manifold line as an alternative to the suction manifold setup.

If automatic pump operation features are included in the design, the trigger switch should be located within the area benefited at the point of least anticipated drawdown.

Depth and diameter. The well depth and diameter shall be of such that the amount of water that can be drawn from the aquifer is sufficient to maintain the desired drawdown throughout the crop-growing season. Gravel envelopes may be used in conjunction with screens to serve as a filter and to increase the effective diameter of the well.

Casing. All wells shall be cased with steel, concrete, plastic, asbestos-cement, or other material of adequate strength and durability. The casing shall have a diameter that is adequate to accommodate the required pumping equipment.

Screens. All wells shall be equipped with manufactured screen sections, well points, shop-perforated metal casing sections, or field-perforated sections meeting the criteria stated below.

The screen openings for aquifer material of near uniform size shall be slightly smaller than the average diameter of the aquifer material.

For graded aquifer materials (of nonuniform gradation), the screen openings shall be of such that 25 to 40 percent of the aquifer material is larger than the screen opening.

Screens. Number 60 screen has been effective in the sand strata in the Lower Rio Grande Valley of Texas. Plastic mesh-type screen, equivalent to screen 60, has provided adequate yields without pumping sand and is acceptable for installation in the Lower Rio Grande Valley of Texas.

A sufficient length of screen shall be provided to maintain the entrance velocity of water into the well at an acceptable level, preferably less than 1/10 ft/s.

The position of the screen in the well shall be governed by the depth of the aquifer below the ground surface and the thickness of the aquifer to be penetrated by the well.

Well Development. *The well shall be developed until it has ceased to produce detrimental quantities of sand and until the continuous discharge rate is 25 percent greater than the anticipated normal production rate of 2.0 gpm per acre served. During the well test, a vacuum gage shall be used on the intake of the pump and suction head recorded.*

The sand strata depths in the Lower Rio Grande Valley of Texas range from 10 feet to 30 feet below the surface. To be acceptable for well development, a stratum should have a minimum thickness of 6 feet.

Outlet. *An outlet for pumped drain water should be provided such that the discharge will not be a direct recharge source to the benefited area.*

Depth of Pipe Manifold. *The minimum depth of cover shall be 24 inches for the pipe manifold to*

facilitate farming operations and to prevent damage.

Observation Wells. A minimum of one observation well shall be installed for each pumped well drain system. If more than 40 acres are benefited by one system, a minimum of one observation well will be installed per 40 acres at the point of least drawdown in order to maintain the desired water level.

Pipe Material. Pipe used for well installation and manifolds shall be Polyvinyl Chloride (PVC) as specified in ASTM-D-1784, with a maximum SDR of 26 and a minimum psi of 160.

Certification and Guarantee. All material shall conform to these minimum requirements and to the tests prescribed in the applicable ASTM Specification. The acceptance of materials used will be by one of the following methods:

A. Onsite approval based on properly marked material showing compliance with the applicable ASTM Specification for all pipe.

B. When conditions warrant, the State Conservation Engineer may elect to request the manufacturer to furnish material test data and written certification of compliance with applicable ASTM Specification, including a description of the method to be used in identifying the certified material. Pipe that bears the seal of approval of the National Sanitation Foundation will be considered acceptable for this certification.

The installing contractor shall certify to the purchaser that the

materials and installation comply with the requirements of these specifications. He shall furnish the purchaser a written guarantee against defective workmanship and materials to cover a period of not less than one year. He shall record on the guarantee the manufacturer's name and markings of the plastic pipe used.

The installing contractor shall furnish the Natural Resources Conservation Service a copy of his certification and guarantee, which will be made a part of the supporting records of the Pumped Well Drain System.

Quality of water. If the water from the well drain is to be used for human consumption, it shall meet all requirements of the state health department or other state agencies having jurisdiction. If the water has a high salt content or is not potable, means of disposal shall be planned and installed concurrently with the installation of the well, which will not adversely affect potable water sources and the environment.

PLANNING CONSIDERATIONS

Water Quantity

1. Effects of the cone of depression on adjacent water uses and users.
2. Downstream effects of the pumped water.

Water Quality

1. Effects of the quality of pumped water on the surrounding environment, water uses, or water users.
2. Effects of well pumping on soil and water salinity.
3. Effects of discharges of pumped water on downstream water temperatures.

4. Temporary and long-term effects on the visual quality of downstream waters.

PLANS AND SPECIFICATIONS

Plans and specifications for constructing well drains shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Plans and specifications shall be prepared for each pumped well drain and shall be based on this standard. Plans and specifications include construction plans, drawings, job sheets, construction specifications, or other similar documents. These documents are to specify the requirements for installing the practice, such as the kind, amount, or quality of materials to be used, or the timing or sequence of installation activities.

Construction Specifications describing the requirements for applying this practice shall be developed from the generalized Construction Specifications (Texas) for Pumped Well Drain. The Construction Details section shall be used to describe site specific job requirements

Required easements, permits, and ingress and egress shall be obtained prior to initiating any work. Copies of easements and permits should be obtained for NRCS files

APPROVAL AND CERTIFICATION

PUMPED WELL DRAIN

(No.)

CODE 532

PRACTICE STANDARD APPROVED:

/s/ JOHN W. MUELLER

State Conservation Engineer

06/12/02

Date