



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD

VERTICAL DRAIN

Code 630

(No.)

DEFINITION

A well, pipe, pit, or bore in porous, underground strata into which drainage water can be discharged without contaminating groundwater resources.

PURPOSE

This practice is used to:

Provide an outlet for drainage water from a surface or subsurface drainage system.

CONDITIONS WHERE PRACTICE APPLIES

This practice is applicable in locations where the underlying strata can receive, transmit or store the design drainage flow, and other drainage outlets are not available and cannot be provided at a reasonable cost. This practice is also applicable where a natural “sinkhole” acts as the vertical drain, and erosion control or treatment of surface runoff is needed.

This practice is applicable only in locations where a determination has been made that it—

- Conforms to local, State, Tribal, or Federal laws or regulations.
- Will not contaminate groundwater resources.
- Will not affect in-stream habitat by reducing surface water flows.
- Will not negatively affect underground habitats by introducing surface water flows.

CRITERIA

The number, size, and location of vertical drains must be adequate to discharge the design drainage flow into the underlying stratum or strata. Base the capacity of the vertical drain system on a field determination of the depth, permeability, porosity, thickness, and extent of the strata.

Design the minimum diameter of uncased wells to be 6 inches and the minimum diameter of cased wells, to be 4 inches. Well casings must be of adequate strength and longevity to serve planned needs.

Where planned drains will divert significant amounts of surface water underground, determine the aggregate effect on streamflow, and take steps in the design to avoid any potential negative effects on in-stream and riparian habitat. Also, provide a suitable filter system, desilting basin or other means necessary for removing sediment and other contaminants from the water before it enters the vertical drain.

Provide for public safety around vertical drains.

Vertical drains are classified as Class V injection wells and require notification to the US Environmental Protection Agency, Region IV for inventory purposes.

Additional Criteria To Improve Quality of Recharge Waters Entering the Groundwater System

Livestock shall be excluded from the vertical drain area.

Filter strips shall be installed around vertical drains where contamination from agricultural herbicides, pesticides, and fertilizers is possible.

CONSIDERATIONS

Significant additions to subsurface water sources may raise local water tables or cause undesirable surface discharges down-gradient from the vertical drain.

Caution should be taken when installing vertical drains in and operating equipment near active unstable sinkholes. Some cities and counties have enacted zoning regulations which restrict the practices that can be implemented in karst areas. These regulations should be considered when planning or applying conservation practices in sinkhole areas.

Construction related effects on groundwater resources must be considered. Measures shall be taken during design, construction, and vegetative establishment to minimize erosion and pollution. This may include details and specifications for such items as silt fences, hay bale barriers, temporary vegetation, mulching, etc.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for installing the vertical drain and include a complete description of requirements for properly installing the practice to achieve its intended purpose. Include, at a minimum:

Documentation of aquifer characteristics, geology, and history of site relative to sources of potential contamination, such as nutrient and pesticide application, septic systems, chemical storage facilities, landfills, roads, animal waste storage or treatment facilities, or naturally occurring sources of contamination.

OPERATION AND MAINTENANCE

Prepare an Operation and Maintenance (O&M) plan that describes specific instructions for maintaining the vertical drain. The O&M plan must include at minimum:

- Periodic inspections of inlets to vertical drains to ensure that they are not plugged or damaged.
- Maintenance of vegetative filters, sediment basins, and other filters per operation and maintenance requirements for each of the respective conservation practice standards.

REFERENCES

USDA NRCS, National Engineering Handbook, Part 633, Chapter 26, Gradation Design of Sand.