

How should you use geotextiles on a dam?

Geotextiles used to control erosion, secure slopes, and other civil engineering needs often are used on dams and levees. These porous materials are made to resist ultraviolet rays, soil chemicals, mildew, and insects. Specialty geotextiles, too, may have fibers fused by heat or interlock knitting and are available in coarser geogrids or geonets. Typically made from polypropylene or polyester, geotextiles are either woven or non-woven:



Woven: Made from individual filaments formed into a stable network, this high strength fabric commonly is used for the stabilization of stream banks and other erosion control areas. It comes in different strengths to meet specific requirements.

Non-woven: Fibers typically are needle-punched to form an interlocked fabric that allows water but not soil to pass through. This material is often used for drainage, protection, and stabilization.

The Federal Emergency Management Agency recommends geotextiles as a filter between embankment and riprap on the upstream slope or downstream discharge area and other filtering uses. The Natural Resources Conservation Service has used geotextiles in a separator function, for example, by placing it between rock riprap and soil in rock-lined plunge pool basins and outlet channels. NRCS also has placed geotextiles beneath riprap on the upstream slope of dams for wave protection. At the Division of Water Resources, engineers report seeing geotextiles used in Kansas as turf reinforcement mats in auxiliary spillway channels to prevent erosion while vegetation establishes. They also have seen geotextiles used as boundary layers to prevent migration of fine particles into coarser material areas such as wrapping the sand of a filter diaphragm to prevent fine soil particles from washing into the filter itself.

The National Dam Safety Review Board maintains that geotextiles should not be used in locations critical to dam safety and should not be used in areas inaccessible for replacement. FEMA advises geotextile feasibility determinations based on these considerations:

- Assess the downstream hazard classification in event of a dam failure including the likelihood for a change in that classification in the future.

- Identify minimum design life and performance level expected of dam.

- Select materials, embankment cross-section, and construction control to achieve the expected level of safety and serviceability for the dam.

- Perform economic analyses to evaluate whether cost savings strongly favor a design employing geotextiles over more conventional building materials.

- Assign a Design Classification for the proposed geotextile application and select appropriate geotextile.

- Identify all potential failure modes from which the design element is proposed to protect.

- Conduct failure mode analyses to predict likely impact on dam integrity.

For more information, see FEMA's [Geotextiles in Embankment Dams](#) .