

**SOIL MANAGEMENT – EROSION**

Criteria	Category 4	Category 3	Category 2	Category 1
<p><b>4-16 Erosion from Roads, Ditches, and Culverts</b></p> <p>(skip if site has never been prone to erosion)</p>	<p>I have implemented a comprehensive erosion control plan customized for my vineyard roads, ditches, and culverts</p> <p><i>And</i></p> <p>Site-appropriate measures for roads are in place to prevent erosion (e.g., paved, vegetated, or outsloped roads; rolling dips, water bars)</p> <p><i>And</i></p> <p>Ditches are appropriately managed to prevent erosion and downcutting (e.g., vegetated or hardened*, ditch relief culverts installed)</p> <p><i>And</i></p> <p>Culverts are properly sized, positioned, and managed (e.g., inlets and outlets hardened to prevent scour, riprap** incorporated into outflows) to prevent erosion during high-flow events</p> <p><i>And</i></p> <p>My road maintenance is regularly scheduled and effective.</p>	<p>I have taken action(s) to eliminate obvious sources of erosion (e.g., outsloped or vegetated roads, vegetated or hardened* ditches, incorporated riprap** into culvert outflows)</p> <p><i>And</i></p> <p>I have developed a comprehensive erosion control plan customized for my vineyard roads, ditches, and culverts</p> <p><i>And</i></p> <p>My road maintenance is regularly scheduled</p> <p><i>But</i></p> <p>During large storm events, heavy use roads continue to noticeably erode, downcutting of ditches remains evident, and/or visible scouring continues at culvert inflows or outflows.</p>	<p>I have taken action(s) to eliminate obvious sources of erosion (e.g., outsloped or vegetated roads, vegetated or hardened* ditches, incorporated riprap** into culvert outflows)</p> <p><i>But</i></p> <p>I have not developed a comprehensive erosion control plan customized for my roads, ditches, and culverts</p> <p><i>And</i></p> <p>My road maintenance is sporadic (i.e., as needed) rather than preventive and regularly scheduled.</p>	<p>Erosion occurs on roads, in ditches, or at culverts associated with my vineyard</p> <p><i>But</i></p> <p>I have not taken corrective action(s) or developed an erosion control plan for my roads, ditches, and culverts.</p>

\*Hardening of ditches means the incorporation of rock and/or other erosion control fabrics and liners into the ditch surface.

\*\*Riprap is a loose assemblage of stones used to dissipate water energy and prevent erosion.

#### **BOX 4-9 REDUCING EROSION AND SEDIMENT TRANSPORT FROM ROADS\***

Vineyard roads can be a major source of sediment pollution to streams – delivering damaging nutrient loads, smothering fish eggs, and reducing the variability in stream habitats (which, in turn, can reduce the number of plant and animal species a stream can support). It is important, therefore, to limit erosion associated with roads, and prevent erosion that does occur from reaching streams and other water bodies. Important road-related sediment reduction measures\*\* include:

**Outsloping Unpaved Roads:** Because roadbed erosion can only be completely abated through paving, management of unpaved roads should focus both on reducing erosion rates and preventing sediment that does erode from leaving the vineyard. Like insloping, outsloping roads (where appropriate) minimizes surface erosion by rapidly moving water from the roadbed. However, outsloping has the benefit of dispersing eroded sediments along the hill-slope (where it can be filtered out by cover crops or natural vegetation), rather than concentrating sediment in the ditch (where it can be delivered to nearby water bodies). In addition, by reducing or eliminating the need for ditches, outsloped roads are among the least expensive road types to build and maintain.

**Vegetating Unpaved Roads:** Vegetating unpaved surfaces in or around vineyards (where feasible) can be a reasonable solution for reducing erosion and dust (see Air Quality chapter for more detail on dust mitigation).

**Seeding and Hardening Ditches:** Depending on the degree of slope, ditches should be vegetated or hardened to prevent erosion. For low to moderate slopes, vegetation (e.g., perennial grasses) can be used to stabilize ditch surfaces and filter sediments from unpaved road surfaces. For steeper slopes and points of potential high scour, hardening ditch surfaces with stone and/or other erosion control fabrics and liners may be necessary to prevent ditch erosion and downcutting.

**Stabilizing Culverts:** Sediment erosion can occur at the culvert inlet and/or outlet. At the inlet, culverts (especially if undersized) can impede the free flow of water and associated debris and result in upstream erosion, often forming an upstream “scour hole”. At the outlet, concentrated flows can lead to downcutting and the development of a “perched” or “hanging” culvert, which, in turn, can cause greater erosion of the downstream slope as water falls farther from the outlet. To stabilize culvert openings, soil around inlets and outlets should be well compacted and points of scour hardened (e.g., with riprap). In addition, culverts should be sized to accommodate high flow events and installed at slopes matching downstream grades.

NRCS staff can help greatly in developing erosion control plans for vineyard roads, ditches, and culverts and in implementing necessary erosion control practices. NRCS may be able to offer free project planning and engineering consultation, and, depending on local funding priorities and the practices to be implemented, may cover up to 75% of the project cost through the Environmental Quality Incentives Program (EQIP). To learn more about available resources from NRCS or locate their local office, visit <http://www.ca.nrcs.usda.gov>.

\*The *Handbook for Forest and Ranch Roads* (Weaver and Hagans, 1994) is an excellent source of information for designing and maintaining roads.

\*\*Permits may be required for work on roads or culverts that require the grading of slopes, potentially deliver significant sediment to water bodies, or modify the bed or bank of streams. NRCS, Resource Conservation District, or CA Department of Fish and Game staff can provide information on necessary permits and related project requirements.