Erosion control on property roads and tracks – cross-sections and locations

Every farm and grazing property needs roads and tracks. With careful planning, construction and maintenance, these can be effective and inexpensive to maintain. In the planning and construction of roads and tracks, it is important to implement measures to prevent erosion. This can result in reduced maintenance costs as well as improved downstream water quality.

Roads can attract runoff. This is because water follows the easiest path and will flow down a road in preference to adjacent pastures or crops. A road may not show obvious signs of erosion for many years. A big rainfall event however, can suddenly create problems. Heavy rain is frequently blamed for causing serious damage to roads, but the problem is often associated with the way the road was built or maintained.

This science note considers different cross-sections used for property roads and outlines how each is affected by the surrounding landscape. It should be read in conjunction with the science notes *L240* and *L241*.

Before undertaking any clearing for a road or track, all requirements under the *Vegetation Management Act 1999,* the *Sustainable Planning Act 2009 and the Vegetation Management Framework Amendment Bill 2013* must be followed.

Road and track cross-sections

The cross-section of roads or tracks impacts on how they perform and how much maintenance they require. They may have four possible cross-sections:

- formed roads (also referred to as crowned roads)
- roads or tracks at ground level
- subsurface roads or tracks
- infalls or outfalls (applicable to steeper slopes).

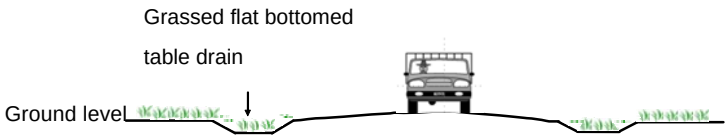

Figure 1 – Formed or crown roads

Erosion on formed or crowned roads can be prevented by:

- managing the runoff flowing down the table drains by using spur drains
- allowing runoff to cross the road by using culverts, whoa-boys, floodways or inverts
- ensuring drains are grassed and flat bottomed rather than v-shaped (restricting the width of a road reserve by using v-shaped drains can lead to erosion problems).

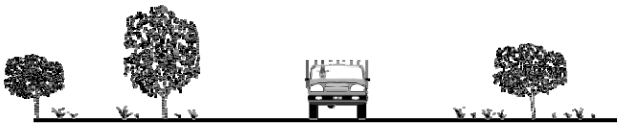

Figure 2 – Roads or track at ground level

Tracks at ground level are suitable for low traffic situations. Erosion can be prevented by:

- removing obstacles with a stick rake or very light grading when making a new track. This ensures minimal disturbance and prevents windrows that divert or concentrate runoff. On gibber plains, tracks can be created by rolling so that the gibber mantle remains intact
- allowing runoff to cross the road by using whoa-boys on sloping land or inverts in drainage lines. Roads on the contour however, have no need for such structures.

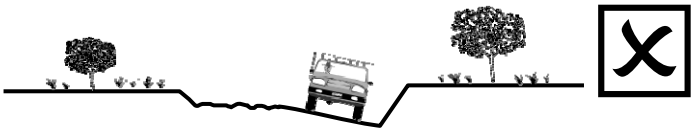

Figure 3 – Subsurface roads (not recommended)

Roads often become subsurface when they are graded inappropriately to remove wheel ruts. Subsurface roads are not recommended for the following reasons:

- their base often consists of highly erodible subsoils
- they are at risk of becoming an eroding waterway or gully.

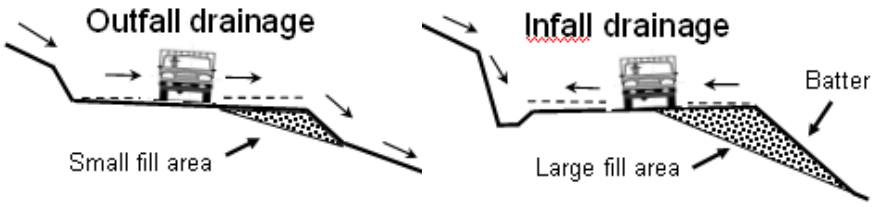

Figure 4 – Cross-slope roads (outfall and infall)

Outfalls are the best option for low usage roads on steep slopes provided you:

- stabilise upslope and downslope batters
- provide a cross fall of 15cm to 25cm to allow adequate drainage.

Infall drainage is less desirable as it requires:

- adequate table drains and culverts
- more earth moving, which increases the risk of erosion and slumping of the exposed batters.

Road and track location

The erosion risk to roads and tracks depends on their slope and where they are situated in the landscape. Tracks taking the shortest route often have erosion problems. Figure 5 shows how roads and tracks may be located in relation to the topography. The arrows represent the direction of runoff in the landscape.

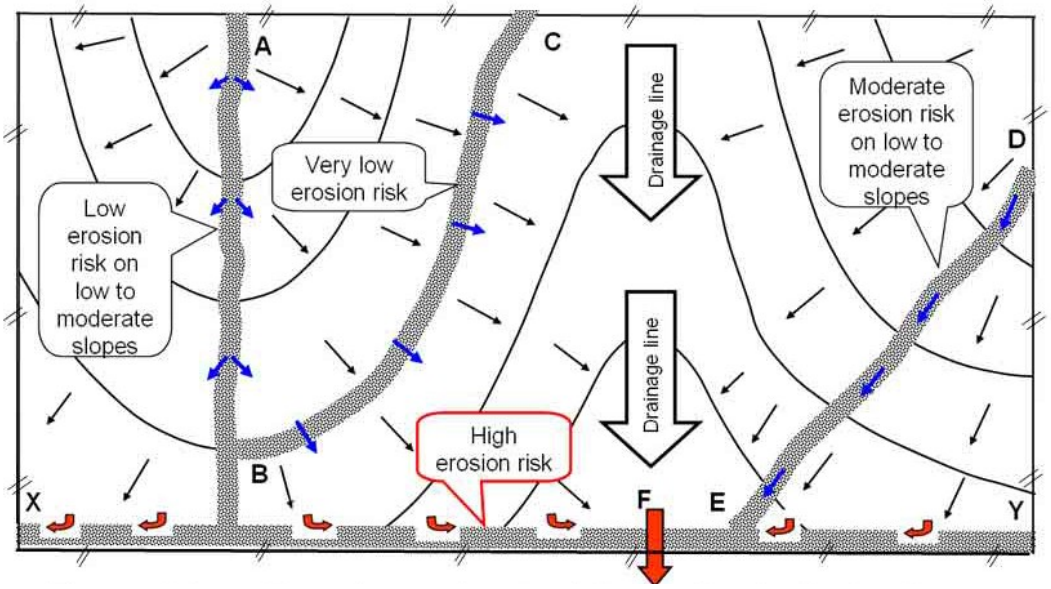

Figure 5 – Location of a road or track in relation to landscape

Roads and tracks on ridges

Ridges (section A–B in Figure 5) provide an excellent location for roads and tracks. Ridge slopes are not as steep as slopes on adjacent areas and runoff drains away from ridges. Whoa-boys (also referred to as water bars, cross banks, humps or diversion banks) will usually be required. Because you can see more land, roads on ridges are excellent for property inspections.

Roads and tracks on the contour

Roads on the contour (B-C in Figure 5) perform well. Whoa-boys are not required and maintenance costs are minimal. Surveying for contoured roads does not have to be highly accurate. Minor deviations from the contour can allow wheel ruts formed in wet conditions to drain more quickly after rain. Contour roads are also beneficial as they enable access to and inspection of the middle of a paddock.

Roads and tracks directly up and down the slope

A road directly up and down the slope (D-E in Figure 5) usually has a lower erosion risk then one running diagonally across the slope (X-Y). It may be steeper, but it does not intercept overland flow. Long lengths are susceptible to rutting, but it is relatively easy to provide whoa-boys to remove runoff.

Roads and tracks diagonal to the slope

Most tracks along fence lines will run diagonally to the slope (X-Y in Figure 5). They often have a high risk of erosion due to a large ‘catchment’. They intercept overland flows and redirect runoff down the road or table drain, depriving the land below of useful runoff. To overcome erosion problems provisions that allow overland flows to cross the road must be made.

Roads and watercourses

Where formed roads cross drainage lines or creeks (point F in Figure 5), an invert, floodway, causeway, culvert or bridge is required. Inverts are constructed by removing the soil in the crossing and replacing it with a heavy gravel that resists flows. A sheet of geo-fabric below the gravel ensures that the soil and gravel remain as separate layers, which increases the effective life of the invert. Culverts (pipes) need to be sized according to the area drained as they can be susceptible to blockage from siltation, which hinders the natural flow of runoff.

By selecting a suitable location for crossing a watercourse it is possible to reduce construction and maintenance costs as well as minimise any adverse effects on the watercourse. Consider the following:

- avoid steep banks as they are an erosion risk and require considerable excavation
- use whoa-boys on the approaches into the drainage line where necessary
- cross drainage lines at right angles and avoid sites where clearing of vegetation would be required.

Further information

This and other science notes are available from the Queensland Government website www.qld.gov.au – search ‘science notes’ or for further information about this science notes series phone **13 QGOV** (13 74 68) – Ask for science notes – Land series 239. Other science notes related to this topic include:

• L240 Erosion control on property roads and tracks—managing runoffl

• L241 Erosion control on fences and firebreaks.

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