Soil erosion solutions

Helping North Coast landholders reduce soil erosion

Fact sheet 6: Roads and tracks

Farm roads and tracks can erode badly in heavy rains and quickly become untrafficable or unsafe. The erosion is usually due to poor design or lack of drain maintenance. Once the track becomes a drain it will quickly scour, with the soil ending up as sediment in drains and waterways. This leaflet looks at ways to minimise erosion on farm roads and tracks.

1. Track design

Good track design aims to minimise erosion potential. A well-designed track

- is above flood level
- follows the contour of the land as much as possible
- has minimal cutting and filling
- has a slight grade to stop water ponding on the track and creating boggy areas
- has a slight cross slope to encourage drainage
- is separated from streams by vegetation buffers to trap any eroding soil

A banana plantation with correctly constructed roads running across slope.

In the long term a longer track over gentler terrain is more stable and requires less maintenance than one with high steep batters that are difficult to stabilise. If you have to have steep batters, fence them off from livestock, include ledges in the batter to break the flow of runoff, and make the batter surface rough to help plants establish.

Steep track sections require careful design. Generally 10 degree slope tracks should be the maximum as steeper grades will need special drainage works, and may need hard surfaces. Design for what the soil can handle, not the vehicle. The limits of stable track design are much lower than four wheel drive ability.

2. Track surface

The choice of track surface depends on the type and volume of traffic that will use the track. Grass cover is best for low use tracks, with gravelling where ruts develop. Frequently used tracks may require metalling. Steep sections of high traffic roads where gravel washes away may need a hardened surface such as bitumen or concrete.

Concrete tracks may be required for steep or problem areas.

3. Upslope drainage

Where tracks cross a watercourse or drainage line they are vulnerable to erosion from the speed and volume of the water from further up the slope. You need robust structures to take the water across or under the track. Structure options include:

- Fords. Rock-lined fords are used where the approaches to the crossing are not steep

enough to require excavation. Shallow depressions or swampy areas can be paved with stones or logs placed across the track.

- **Culverts.** Culverts are suitable for streams that do not carry much debris (as debris can quickly block the culvert and make it ineffective. The culvert must be large enough to accommodate peak flows.
- **Bridges.** Bridges are required where the drainage line is a deep gully, or likely to carry large debris.

4. Road surface drainage

Rain falling on a compacted track will quickly concentrate into erosive streams that scour soil out of the track and make it difficult to negotiate. To avoid this, provide regular cross drains to take the water off the track and disperse it safely on to surrounding land.

Cross drains can be earth banks across the road (also know as 'whoa-boys'), or recessed half pipes (concrete or steel) where the grade is too steep for vehicles to easily negotiate an earth bank.

Earth bank cross drains work best when constructed at a slight angle to the track with a grade of approximately 1:20.

Recessed pipes, which hold a smaller volume of water but cannot erode, need to cross the track at a more oblique angle and a steeper grade. The faster flow of water will help to keep the pipe clean. If the grade is too flat sediment will fill in the pipe so water flows over and down the track. The recessed pipes are likely to need more frequent maintenance than earth banks.

Generally it's best for water to drain off the track to the outside slope. However, where the track is constructed on unconsolidated fill, or the outside bank is more than a metre high, draining to the outside slope may cause rapid erosion. In these situations direct the water to the inside slope and into culverts that cross under the track.

5. Drain outlets

Allow space at the drain outlet for water to spread so that it spills across a broad edge, rather directing a concentrated flow. If possible place rocks at the drain outlet to dissipate the energy of the fast flowing drain water. Avoid discharging the drain to a waterway. Direct the water onto dense vegetation such as grass to filter sediment and hold the soil in place.

6. Track maintenance

Check all drains at least once a year, and repair and clear where necessary. Most of the damage to roads and tracks happens when a drain fails, through filling in, blockages or banks wearing down. Regular maintenance can help avoid costly large-scale repairs.

If you can, avoid driving on the track when the soil is wet. This will help stop wheel ruts forming and reducing the effectiveness of the cross drains. Don't drive in the same wheel tracks all the time and use lighter vehicles where possible.

When working on a track always minimise disturbance to soil and vegetation. Avoid blading soil except where necessary to form the surface. Start revegetation immediately following any soil disturbance while the soil is soft, regardless of the season.

More information

Guidelines for the planning, construction and maintenance of tracks (DLWC 2994)

http://www.dlwc.nsw.gov.au/care/soil/soil%5Fpubs/pdfs/guidelines_tracks.pdf

Tracks and roads (DPI Victoria 1999)

http://www.nre.vic.gov.au/DPI/nreninf.nsf/childdocs/-2BAF4D73531CD1544A2568B3000505AF-57D1EB72F146450ECA256BC80004E8DD-966D71ECF369B7C44A256DEA0027B670-3698841B41D97B34CA256BCF000AD50E?open

NSW DPI's website has information on soil erosion:
http://www.dpi.nsw.gov.au/agriculture/resources/soils/erosion

To discuss your specific soil erosion issues, contact NSW DPI soils advisory officer Abigail Jenkins, Wollongbar, on 6626 1357 or abigail.jenkins@dpi.nsw.gov.au.

Northern Rivers CMA CATCHMENT MANAGEMENT AUTHORITY

Produced by NSW DPI Wollongbar for Northern Rivers CMA project 'Revegetation/improved management of areas with high erosion risk'.

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