Maintaining contour banks

Contour banks, combined with effective stubble management, are recommended to control erosion on sloping land used for growing crops.

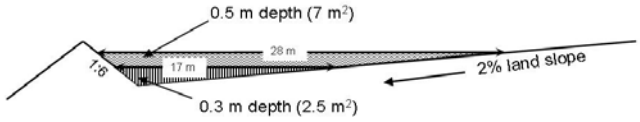
Well maintained contour banks can minimise the impacts of heavy storms and prolonged rainfall. Poorly maintained contour banks are a liability. Their failure will lead to erosion in the contour bay below and possible failure of the banks below them.

Many farmers are now working contour banked paddocks parallel to a fence, going up and over the banks—a practice referred to as ‘tramlining’. Low contour banks are easier to cross, but their capacity may be inadequate.

Contour bank capacity

Recommended contour bank capacity depends on many factors including the length of the contour bank and the bank spacing. As shown in Table 1, contour bank capacity increases significantly as bank height increases.

Table 1. Effect of bank height on cross-sectional area

Contour bank height metres (m)	Cross sectional area square metres (m^2)
0.3	2.5
0.4	4.5
0.5	7.0
0.6	10.1
The above data is based on the following cross section 	

The science note L205 'Contour bank specifications' provides advice on contour bank capacity.

How bank capacity is reduced

Contour bank height may reduce by 30–40 per cent after construction. Banks built with bulldozers tend to settle more than grader-built banks. High settlement rates are likely to occur when banks are built on moist, cracking clay (e.g. Vertosol) soils.

When paddocks have low levels of cover, a heavy storm can move up to 50 tonnes of soil per hectare into the contour bank channel. Contour banks ensure that most of this soil remains in the paddock but the sediment can greatly reduce the bank’s capacity. Sediment deposits in bank channels cause ponding, which inhibits planting, weed control and harvesting operations.

Wheel tracks over contour banks in moist soils can be 15–30 centimetres deep. Table 1 shows that a wheel track reducing effective bank height from 0.5 metres to 0.3 metres would reduce its effective capacity from 7 metres squared to 2.5 metres squared—an 80 per cent reduction.

In addition, tillage equipment crossing contour banks when tramlining can reduce bank capacity by dragging-down the crest of the contour bank.

How to check capacity

Contour bank capacity can be checked by using a length of string and a line level as shown in Figure 1. On steeper slopes, an alternative is to use a builder's level on a straight piece of timber. A surveyors level or a hand held laser can also be used.

For most contour banks a reasonable estimate of their cross-sectional area can be obtained by assuming that the shape is equivalent to a triangle.

The following formula can then be used:

$$A = \frac{W * H}{2}$$

A = cross sectional area (m2)

W = width of contour bank channel

H = bank height (m).

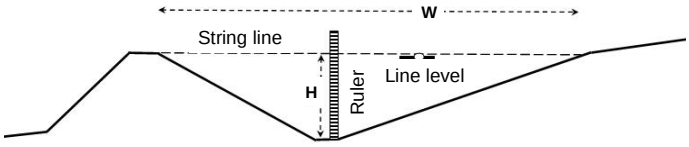


Figure 1. Checking bank capacity with a line level

For example, (using Table 1) if the bank height was 0.5 metres and the width measured with the string line was 28 metres, the cross-sectional area would be 7 metres squared.

It is important to check capacity in any obviously low points as this is where bank failures are most likely.

Problem areas

The weakest link in a contour bank is often where it has been constructed across a former gully. Higher rates of settlement can occur at this point and the effective height of the bank may be much less than the average.

To identify these low points, look upwards at the bank from the middle of the contour bay below (see Figure 2). These points require additional height and allowance should be made for any settling.

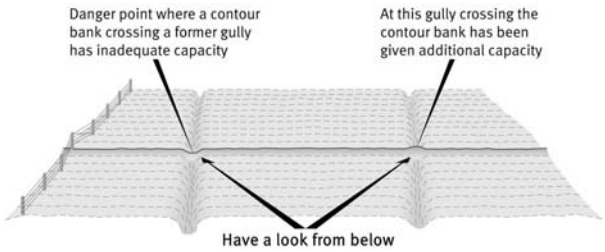


Figure 2. Identifying low spots where banks cross gullies

Special attention should be paid to where contour banks discharge into grassed waterways. Excessive grass growth at this point should be slashed as it will retard flow into the waterway. The reduction in flow rate causes silt to be deposited which further reduces capacity at this critical location.

If contour banks are crossed by vehicles or animals at the point where they flow into a waterway, the risk of failure is even greater. Tracks over contour banks should be at the beginning of the bank rather than at the outlet. If a bank has to be crossed at the outlet end it should have additional capacity at this point.

If bank outlets are eroding, options would be to:

- stabilise the waterway
- batter the contour bank channel down to the waterway floor
- construct a rock chute at the outlet.

Cracks or tunnels can lead to contour bank failure if they fail to seal up before a run-off event occurs. Cultivating the bank batter should help to alleviate these problems.

How to maintain banks

Banks are maintained by using earth moving equipment to move sediment and soil out of the channel and onto the contour bank to increase its height. Soil can be moved more easily when it is dry and it has been previously ripped or cultivated.

On large contour-banked paddocks, specialised tractor-drawn grader blades are frequently used to produce a suitable channel shape.

On smaller paddocks, dozers or motorised graders are often used. Dozers are useful when there are major contour bank breakages or gullying to repair. Scrapers can be used to remove sediment in the channel and use it to level rills and gullies in the contour bay above the bank.

Contour banks on grazing lands

Many paddocks in closely-settled areas were once cropped and contour banked. They have since been returned to permanent pastures because of unprofitable returns from cropping.

While contour banks are required in cropped and sloping paddocks, a well-managed pasture should not require contour banks. In this instance, while upgrading is an option it may be acceptable to allow existing banks to gradually subside. Provided the pasture is well maintained, the adverse consequences of such an approach should be minimal.

If contour banks in grazing lands are below specifications and are causing problems where they break or overtop, they should either be upgraded or completely removed.

Key points

- Maintain high levels of surface cover in contour bays to reduce silt deposition in bank channels.
- Check bank outlets and points where banks cross old gully lines.
- Level out rills, gully lines and old fence lines.
- Repair any broken contour banks and remove silt plugs from channels as soon as possible after a run-off event.
- Maintenance is best done during dry periods when the land is in fallow.

Further information

This and other science notes are available from the Queensland Government website www.qld.gov.au – search ‘science notes’. For further information about this science notes series phone **13 QGOV** (13 74 68) – ask for science notes – Land series L202. Other science notes related to this topic include:

- L35—Run-off control measures for soil conservation

- L205—Contour bank specifications

For further information on soil erosion visit http://www.qld.gov.au/environment/land/soil/erosion/ or email soils@qld.gov.au.