

# **GUIDE TO TRACK CONSTRUCTION**

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Are you thinking of building a track on your property? Once constructed, a track will last in the landscape for hundreds of years. Well sited and suitably constructed and maintained tracks are an asset to your property, while inappropriate tracks can lead to environmental damage and become an “eyesore” for the property.



*Without a good drainage system, tracks will erode, like this one.*



*This well constructed track has been shaped with a wide, grassed drain (right of track) to transport water, and a cross drain (foreground) to carry water safely over the track. It has been surfaced with rubble and is well compacted*

## **Summary**

1. Allow yourself plenty of time to plan your track. A number of approvals may be required, and contractors may need to be booked well in advance.
2. Make sure your track fits in with your property management plan.
3. Choose the site for your track based on the natural features of the land.
4. Avoid damaging native vegetation.
5. Take precautions against spreading soil borne diseases and weed seeds.
6. Design your drains and diversions carefully to avoid water erosion.

## PLANNING

### **1. Give yourself time to plan**

- Careful planning is critical for constructing good tracks, so **allow plenty of time**.
- You may need to **book a contractor several months in advance** of construction. Talk over your plans with the contractor, they can give you practical, constructive feedback as well as some good ideas.
- Construction of the track should be done when the **soil is at the right moisture content**, that is when it is moist enough to be excavated and compacted, but not too wet that it is sloppy, making mid to late spring and early to mid autumn the best times for construction. A track constructed in spring will have plenty of time to compact before heavy winter rains, but will have little vegetation establish on the disturbed soil, leaving it vulnerable to water erosion by summer rain storms. Tracks made in autumn can be revegetated immediately, but there is a risk that heavy rains will arrive before the track is fully completed and cause erosion.

### **2. Approvals**

- A number of approvals may need to be sought for constructing a new track or modifying an existing track.
- Councils have restrictions on the amount of soil that can be removed without council approval. Contact the Planning Department of your local Council to find out if you need approval.
- If construction of your track will involve clearance of native vegetation you may need to apply to the Native Vegetation Council for vegetation clearance approval, which can take several months (see also section below).
- If you are going to construct a creek crossing you will need to consult with your local Catchment Water Management Board.
- If your track will run along your boundary, consult with your neighbour before you start, especially if you will be redirecting water through their property. It is far better to agree on the details first than to fight over them afterwards!

### **3. Purpose**

- The finished track must satisfy the following two criteria:
  - It must be structurally strong enough to carry the loads imposed by the heaviest use to which it will be put (ie four wheel drive, motor bike, human on foot). In many cases this may mean simply not allowing water to pond on the surface
  - It must be able to resist wear, this is achieved by providing a surface suitable to the situation (eg grass, crushed stone).
- Therefore the purpose of the track will dictate the type of construction and materials required and hence the cost of the track. Frequently used tracks such as driveways will require at least a rubble surface and may need culverts to transfer run-off, whereas paddock tracks for occasional vehicle use such as weed and fire control and some stock movement may only need to have a grass surface
- Consider the reason for which you are accessing an area. In steep country it may be impossible to achieve the correct batters on the track to minimise the risk of water erosion (see drainage section). Due to erosion risk, steep land is restricted for most land uses including grazing and only really suited to conservation with opportune grazing

#### **4. Placement**

- Careful placement of tracks is critical to avoiding land degradation and save you time, energy and money. Choose the location based on your property plan.
- Tracks up and down headlands and ridges will collect the least amount of run-off and therefore have a low risk of water erosion.
- If the track cannot be on a ridge, minimise the slope of the track, as steeper tracks will require more carefull construction with more cross drains, and carry a higher risk of causing erosion.
- North and west facing slopes tend to be drier than south and east slopes and are thus preferable sites.
- Avoid crossing eroding and historically eroded areas (gullies, landslips, tunnelling) as they may become active if disturbed.
- Avoid going near areas that are considerably wetter than the surrounding areas for a long period, including springs. If disturbed, such sites have the potential to develop into a landslip.
- Avoid low lying wet boggy areas, especially near creeks. Constructing a sound track in these areas is difficult, requiring the road-base fill to be raised and possibly culverts (pipes under the track) included. The track becomes a barrier to ground and surface water movement, altering the local hydrology which can result in flooding, erosion and death of vegetation.

#### **5. Native vegetation**

- Avoid putting the track through an area of native vegetation. Constructing tracks between the trees may still destroy smaller plants, and the track itself can become a barrier to movement of plants and animals.
- Removal of large trees and their root systems can cause erosion, as well as being a loss for biodiversity. Even dead trees are important habitat for birds and other animals.
- Keep tracks far enough away from trees to avoid destroying roots during construction.
- Native vegetation is protected under the Native Vegetation Act 1991 and if it is absolutely necessary to disturb native vegetation, you should contact the Native Vegetation Council (ph 8124 4755).

#### **6. Creek crossings**

- Minimise creek crossings; well constructed crossings are expensive and poorly constructed crossings usually cause damage to the watercourse and creek hydrology.
- Your local Catchment Water Management Board can provide you with assistance in designing creek crossings and must be consulted.

# CONSTRUCTION

## **1. Weeds and Diseases**

- Do you have *Phytophthora*?
- This root disease kills native vegetation and is spreading through the Hills. If you have *Phytophthora* you will need to limit the spread on your own property, and make sure it is not carried off your property on dirty machinery.
- Make sure your contractor does not introduce *Phytophthora* or weeds; their machinery should be cleaned before it gets to your property.
- Be careful not to introduce new weeds into your property, or spread existing weeds further.

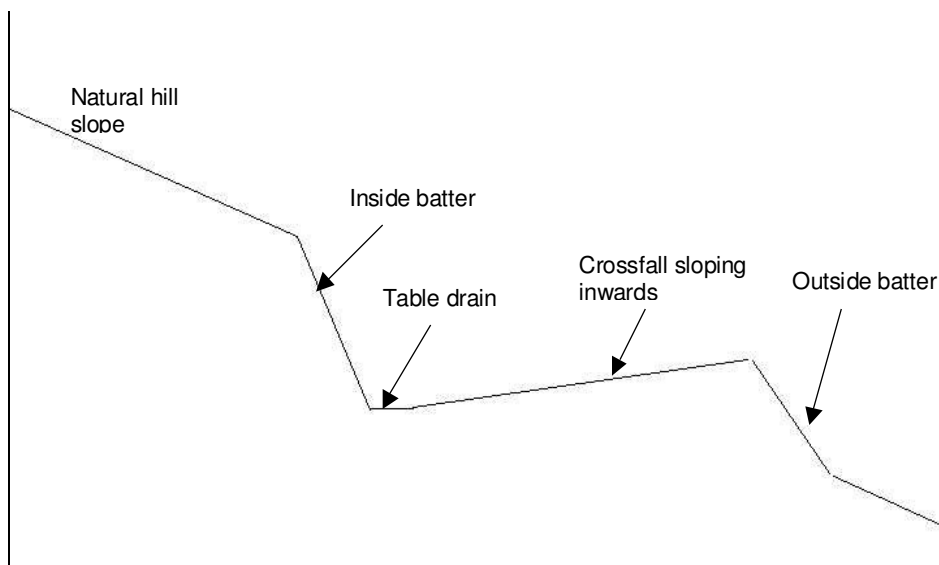
## **2. Gradient – the slope along the track**

- Minimise this as much as possible. The greater the slope the greater the velocity of water that flows down it resulting in an increased risk of erosion. The volume of water running down a sloping track needs to be minimised by diverting water off the track (but in such a way that it does not cause erosion in surrounding areas).

## **3. Crossfall – the slope of the track from side to side**

- If the track slopes inwards towards the up slope then water will run down the inside of the track, requiring a suitable drain and cross drains to be built.
- If the track slopes outwards then water should run off evenly, requiring no drains. However, in the first few years the outside edge will have a high risk of water erosion, until it consolidates and grasses over. This design may also be more dangerous as vehicles will tend to slip towards the outer edge if the track becomes slippery. For these reasons it is preferable to direct water to the inside of the track.

Figure 1: Cross section of track showing different components of design:



#### **4. The batter**

- The batter refers to the angle of the embankment of soil on the down side of the track and the cut on the up side (see Figure 1).
- It is important to get the angle of the batter right otherwise it may collapse. The right angle depends on the soil type, and the sandier the soil the less the slope of the batter should be:

<b>Soil Texture</b>	<b>Max slope of batter</b>
sandy loam to loam	up to 1:1.5 or 33°
heavy clay	up to 1:1 or 45°

- In steep country it may be difficult to achieve the correct batter so you should either engage an engineer or reconsider the route of the track.

#### **5. Drainage**

- A table drain carries water along the inside of the track, however, when too much water collects in the drain it can cause erosion. For this reason it may be necessary to install cross drains to divert water out of the table drain.
- The table drain should be broad and flat in cross section, this way water will move slowly with less likelihood of erosion. A narrow v-shaped drain will concentrate the flow, making it faster and more erosive. As a consequence of transporting water slower, a flat drain will silt up sooner than a v-shaped drain and will need cleaning out. If the problem is severe then the source of the silt needs to be managed (contact the Soil Conservation Board for assistance).
- The steeper the gradient the more cross drains will be required. A rule of thumb developed in Victoria is  $\text{Spacing} = 300 / \% \text{Slope}$ . Therefore, on a 10% slope cross drains would be needed every 30m.
- There are two main types of cross drains.
  1. Swale drains - shaped like a speed hump but run at a diagonal across the road, diverting water out of the table drain, can be broad and flat so they do not interfere with driving.
  2. Culverts - pipes that cross underneath the tracks surface and are more expensive to install, but are necessary for frequently used tracks.

#### **6. Reducing Soil Erosion**

- During the construction phase of the track, and in the first year following, you may need to consider using sediment traps to prevent sediments being deposited in creeks. Hay bales are commonly used as sediment traps by placing them end to end at right angles to the slope (use straw bales where the risk of weed introduction is high).
- You will need to consider where the water goes once it has left the track. Initially it will flow over the outside batter. Therefore it is a priority to revegetate the batters. Annual grasses such as SA Rye Corn are suitable for establishing cover in the short term before local natives are effective. Another method used for short term soil protection is to cover the soil with filter cloth and then spread large (about 50mm) stone over the top of the cloth.
- Never direct water onto bare soil, it will cause erosion. If water is directed onto a grassed area any soil that has been eroded off the track should deposit in the grass rather than in a creek where it is a pollutant.
- Once water leaves the track it should be spread over as wide an area as possible. Rises or ridges are ideal sites, gullies and creeks are the worst.

## **7. Surface**

- A track that has some kind of surface will be less likely to degrade than one which doesn't.
- Grass makes a good surface for tracks that are not used frequently.
- Gravel and/or crushed rock should be used for tracks that are frequently used such as driveways. Make sure that it is well compacted so that the materials stay where they are put.
- Where fine materials are used in the track surface, allow for a buffer strip of at least 5 to 10 metres between the track and any watercourse to catch eroded particles. Erosion from gravel tracks and roads is a major source of water pollution in rural areas.

## **MAINTENANCE**

- To avoid forming wheel tracks which water will concentrate in, don't always drive in the same line. Avoid driving on grass tracks when soil is saturated as wheels will damage track.
- Monitor drains, diversions and track surfaces for signs of water erosion and rehabilitate where necessary.

## ***Human Sources of Information (mostly free)***

Council approvals	Planning Department, Adelaide Hills Council Ph: 8408 0400
Erosion management	Central Hills Soil Conservation Board Ph: 8391 7500
Property management plans	Land Management Program Ph: 8391 7500 (or Project Officer)
Creek crossings	Torrens Catchment Water Management Board Ph: 8271 9190
<i>Phytophthora</i>	Local Council, National Parks & Wildlife Office or Department for Environment & Heritage Ph: 8552 0306
Weed management	Mt Lofty Ranges Animal & Plant Control Board Ph: 8389 6166
Soil type, design of drainage system, erosion management	Land Management Consultant at the Mt Lofty Ranges Catchment Centre Ph: 8391 7508 (or a private engineer)

## ***Other References***

Cummings, D. (1998) *Spacing of cross drains for earthen tracks and roads*, LC0094, Department of Natural Resources and Environment, Victoria.

Cummings, D. (1999) *Tracks and roads*, LC0101, Department of Natural Resources and Environment, Victoria.