Burnett Mary
REGIONAL GROUP
Practical Solutions for Natural Resource Management

Property access tracks

Planning, location, construction and maintenance

The need for farm roads and tracks

The efficient running of a property depends on, among other things, ready access to various locations within the property.

Property tracks are used for:

- Inspecting waters, fences, crops, pipelines, power lines and stock
- Fighting fires
- Pest control (animal and plant)
- Carting stock or grain to and from yards or silos
- Access to houses etc.

The regularity of use for these access tracks determines construction and cost. There are basically two types of road or tracks;

- All weather: used from the public road to the houses, and sometimes stockyards and silos. Generally gravelled and need to be well sited, constructed and maintained.
- Dry weather only: the usual property track. Accessible only in dry weather. The standard of these tracks is variable, the most travelled ones generally being of a higher standard.

Problems associated with roads

Access tracks can be severely damaged by soil erosion if they are not located, constructed and maintained correctly. Erosion generally occurs as deep riling of the surface and gullying of table drains. They are the result of runoff concentrating in wheel ruts and table drains for long lengths of uncontrolled flow over bare or poorly vegetated soils. The degree of erosion is largely determined by the soil type and is accentuated in steep areas where road construction involves considerable soil disturbance and long lengths of steep road grade.

Many level, or near level areas, receive large amounts of surface flow from surrounding undulating areas, and shallow flow hundreds of metres wide are a normal occurrence with moderate rains. Any disturbance to the natural pattern of flow, such as road construction, or merely by the gradual definition following regular use of a track by vehicles, may result in very large volumes of water being diverted away from its natural course. Wherever this occurs serious gullying is an inevitable consequence.

Whether an upgraded bush track or a graded “road”, vehicle tracks can divert runoff, which would normally flow slowly over the land surface and carry it quickly to drainage lines. Once a bank or a channel sufficient to divert runoff is formed by a track, the country immediately downslope is starved of natural water flow and the pasture will suffer.

193 Bourbong Street | PO Box 501 | Bundaberg Qld 4670
TOLLFREE 1300 13 BMRG **P** 07 4181 2999 **F** 07 4154 1427 **E** admin@bmrg.org.au **W** www.bmrg.org.au

Any kind of traffic in areas set aside for water disposal can lead to gullying that is difficult and expensive to repair.

Problems exist where firebreaks and access are required to follow property boundaries which are not compatible with soil and slope limitations. These sites remain as problems and require considerable effort if serious erosion is to be avoided.

Track location

Access tracks should be planned to give the best and shortest access to each part of the property. All the rules that apply to dry weather only tracks apply to all weather access tracks as well. The only difference is the cost.

The best location for a track whether formed or not, is along or close to the top of the main ridges (if these are reasonably accessible) and down a spur ridge if it is necessary to take the track across a drainage line. By having the track on the ridge, less water accumulates on it and it stays dry longer and dries out faster after rain. Also maximum visibility is afforded, which is important when checking on stock and the general running of the property.

If the main ridges are not reasonably accessible, the next best location for tracks is at the foot of the lower slopes, or along the edge of the flat. Tracks in these situations should avoid long straight stretches. They should run in a series of broad bends, so that water diverted by the track is able to leave it regularly at low points.

The flats are ideal places to locate a track. However, if a track is to run for some distance along a flat, it should be located well out near the edge of the flat, or on the adjacent lower slopes. If a track is to cross a flat, the closer it approaches the actual contour, the less disturbance there will be to natural flow.

Where access is required across the slope, it should zig-zag so that low spots occur in the track and drain water off. This zig-zagging reduces volume of runoff and length of slope along the track so that erosion is reduced.

Quite apart from reducing erosion damage to the country, location according to the principles laid down above will save a lot of maintenance, and a lot of travel time and vehicle deterioration.

Track construction

With all weather access roads, the capital costs are relatively high. Therefore it is important that the road is well drained and that the location of the drains run in with existing or proposed soil conservation measures. On long slopes, drainage should be carefully looked at and side drains formed to a length where they will not build up a volume of water so as to cause erosion. This can be prevented by periodically spilling the water out to the side in a flat channel and then letting it spread over the surrounding land or tip into a contour bank.

A dry weather only access track is a low standard, low cost road built with a minimum of clearing and earthworks. Crowning and forming of the track is generally not practised. Gravelling is seldom used except in short sections to overcome specific problems such as waterlogged areas. Until road construction reaches the stage of having a properly formed and drained road, a track or road should be located to minimise maintenance.

If a formed road has to be built, it should be constructed where it will not interfere with natural drainage. There are a number of cases where raised roads constructed across the direction of slope have so interfered with above-slope drainage and below-slope vegetation that water tables have been raised, bringing salts into the rooting zone of vegetation. Reduced grass cover downslope has resulted in reduced infiltration and increased water and wind erosion. Scalds have often resulted.

(a) Clearing of Timber Along the Route

Uprooting of trees on steep erodible slopes should be kept to a minimum, as tree roots bind the soil. In addition, in highly dispersible soils, large root holes predispose the soil to tunnel erosion.

The track should be deviated to avoid uprooting larger trees.

Where it is necessary to cross a watercourse, it is recommended that timber be felled as close as possible to the ground with a chainsaw so that the root systems are left intact and no root holes are left to cause tunnel erosion.

Where fallen timber is not too dense, felled trees should be left lying, rather than stacked. Stacking of felled timber into wind-rows can cause diversion and concentration of runoff. However, where stacking is needed, it is advisable to stack on the contour.

On steep erodible slopes and on stream banks, timber stacks should be left and not burnt. Burning will destroy protective ground cover.

(b) Earthworks

Minimal disturbance to soil and vegetation is important to control erosion. Crowning and cutting of access tracks should be avoided. A light blading to remove obstacles such as stones and logs is all that may be necessary. The access track should be wide enough to allow a change in the position of wheel tracks.

This leaves an obstacle free, but possibly grass covered surface. After some traffic the road will be defined sufficiently by the wheel tracks.

Because crowning and cutting have been avoided, there is no need for table or spur drains for water removal as the water flow is not concentrated.

Grading or blading the track should be avoided as this leaves windrows which block or concentrate water flow attempting to cross the track. If a grader windrow is unavoidable it should be placed on the lower side of the track. At intervals of 20-30m, the windrow should have a hole knocked in it to allow water accumulating on the road to escape. Where the windrow crosses drainage lines it should be flattened.

(c) Whoa-boys

Even when tracks have been correctly sited, wheel ruts can collect water and cause erosion if the length of track is sufficient. In these cases, “whoa-boys” (low trafficable cross banks) are built to intercept runoff and divert it safely to the lower side of the track. “Whoa-boys” correctly located and built, provide effective, cheap, long term, low maintenance road drainage.

Their dimensions should be:

- Batters 4-8m depending on vehicle type
- Height of 0.45 – 0.6 m above channel bottom depending on capacity required
- Channel width of 10-15 m depending on the type of vehicles using the road e.g. if semitrailers need to cross then the channel needs to be very broad.

“Whoa-boys” with dimensions less than the above are rough and slow to drive over. They quickly lose their capacity to drain when compacted by vehicles.

The spacing of “whoa-boys” is determined by the erodibility of the soil and the steepness of the track. Spacing will vary depending on the characteristics of individual sites. A general guide for existing tracks is to measure the length of water runoff before riling starts. Banks should be equal to or less than this length.

On steep grades they may need to be spaced as close as 30-60 m depending on soil type and track conditions.

Effective "whoa-boys" can be built on roads with gradients of up to 26%. Beyond this gradient they have inadequate capacity and are difficult to negotiate even with a four-wheel drive vehicle. At this slope, the downhill batter of the bank approaches 48% which is close to the grade limit for most four-wheel drive vehicles. Alternative road routing should be looked at when slopes exceed 26% on soils with high erosion hazards.

A suitable outlet point must be selected for the "whoa-boys", one that is not blocked by a stump or rock. The outlet should be located so that water will spill into undisturbed vegetation and can't flow back onto the road.

A grade across the road of 10-15 cm will make sure water does not pond in the channel (depending on soil type).

The earth for the "whoa-boys" should all come from the uphill or channel side unless that would expose a dispersible subsoil. In which case soil should be pushed up from both sides or even carted in.

After construction a sweep with the blade will clean the channel. The small bank of earth resulting at the outlet end can be left to act as a silt trap and water spreader. This should be pushed far enough so that draining water can clear the road effectively.

If an eroded table drain has to be filled to build a "whoa-boy", the bank at that point must be well compacted with extra earth to allow for slumping and to cope with the concentration of runoff in the table drain.

(d) Track Cross fall

If a formed road is required in certain instances, e.g. to stockyards, and it must negotiate some sloping land, a method of construction called cross fall surfacing can be used. A slight camber (10 – 25 cm depending on soil type) towards the downhill side of the track reduces runoff flow along the road to a minimum as runoff is directed across the road surface and over the road batter. The low profile side of the track reduces runoff flow along the road to a minimum, as runoff is directed across the road surface and over the road batter. The low profile associated with this standard of road can withstand the dispersed flow of cross fall drainage. To ensure effectiveness of the cross fall, any earth windrow which develops at construction on the downslope side of the road should be bladed off.

The amount of camber provided for adequate drainage may create safety problems on the road. To maintain cross fall and ensure that wheel ruts do not concentrate water, "whoa-boys" still need to be built on sloping sectors of track.

(e) Gully Crossing

Particular attention should be given to tracks where they cross gullies or streams. It is essential that runoff is prevented from following the tracks into the gully crossing as serious erosion can occur in these areas. A "whoa-boy" should be built 20 – 30 m back from the edge of the gully.

Maintenance

The practice of improving access on minor roads and tracks by scraping or cutting a flat channel with a grader blade, generally along a former vehicle track, causes very considerable erosion damage for very doubtful benefits to access. This form of construction merely provides a convenient channel for water to flow in.

Once such a track is cut there is a necessity for further maintenance and an exacerbation of the problem after every substantial rain. This results in the track being cut deeper, until it

may be 15 – 45 cm below the natural ground surface and forms a permanent watercourse.

If a track is important enough, or degraded enough to warrant mechanical treatment, the first consideration should be relocation to a position which will minimise erosion damage and hence maintenance. If it is preferable to leave the track in its present position, it should be graded only where necessary to straighten it or to repair damaged sections. If the grading produces a windrow all previous comments on windrow apply.

Once a track is cut to more than a centimetre or two below the natural surface, it is necessary to construct spur drains to direct water off the road at frequent intervals, and thus prevent run-off from building up in velocity and volume sufficient to cause erosion. Well located tracks with “whoa-boys” largely eliminates the need for grading the surface of the track. This grading creates an erosion hazard by itself. The track construction and stable “whoa-boys” outlets combine to reduce track erosion. Excess vegetation should be controlled by slashing rather than grading. Capacity of “whoa-boys” should be maintained.

Frequent changing of wheel track positions on the track prevents ruts forming. Regular inspections of tracks should be done and any serious damage repaired as soon as possible.

Compiled by, John Day 2014 from DNRM historic soil conservation data.