Geo Logs (coir logs)

INSTREAM PRACTICES

Flow Control	✓	No Channel Flow	✓	Dry Channels	✓
Erosion Control		Low Channel Flows	✓	Shallow Water	✓
Sediment Control		High Channel Flows	[1]	Deep Water	[2]

[1] Geo logs can be used in watercourses varying from minor stream to major rivers.

[2] Though primarily a shallow water device, the logs can be stacked to increase their height (Photo 2), thus allowing their use in deeper water environments.

Symbol Log

Photo 1 – Geo log (log is being displaced at an industry field day, not on an active erosion site)

Photo 2 – Geo logs placed on the outside of a channel bend

Key Principles

1. Geo logs are 'isolation barriers' primarily used to separate recently established lower-bank vegetation from minor wave action or persistent stream flows.
2. Due to their biodegradable nature, geo logs should not be used as a structural component of bank stabilisation (i.e. the eventual decay of the log should not be allowed to result in failure of the bank). Thus the erosion control benefits of the geo log must eventually be replaced by other measures such as established vegetation.
3. Critical design information includes log location (relative to the water's edge), and details of the securing method (i.e. stake placement and use of tie cords).

Design Information

Geo logs are typically manufactured in diameters of 200, 300 or 500mm, and lengths of 1.2 to 3m. The logs are primarily manufactured from coir (coconut fibre), but may also incorporate jute.

Maximum allowable stream velocity is around 1.5m/s.

Maximum allowable wave height should not exceed the top of the log or log stack.

Wave heights exceeding 0.75m are likely to damage a well-secured log stack.

When placed along a channel/river bank, the logs must not be recessed into the bank more than 1/3 the log diameter.

If stream flows are likely to overtop the logs, then appropriate measures must be taken to prevent bank erosion (Figure 4) along the landward side (i.e. facing the channel bank) of the logs. This can be achieved with the placement of rock checks (Figure 5) at a spacing not exceeding 3m, or the use of logs placed laterally up the channel bank (Figure 6).

The geo logs are normally secured by driving stakes between the outer netting and the core material each side of the logs, not through the centre of the log.

The stakes are spaced (one on either side) at intervals not exceeding 1m (Figure 3). Once driven into the ground, the stakes should ideally sit flush with the top of the log (Figure 2 & Photo 1). If the stakes sit proud of the log (Photo 4), then the stakes can catch debris in flood events and become displaced.

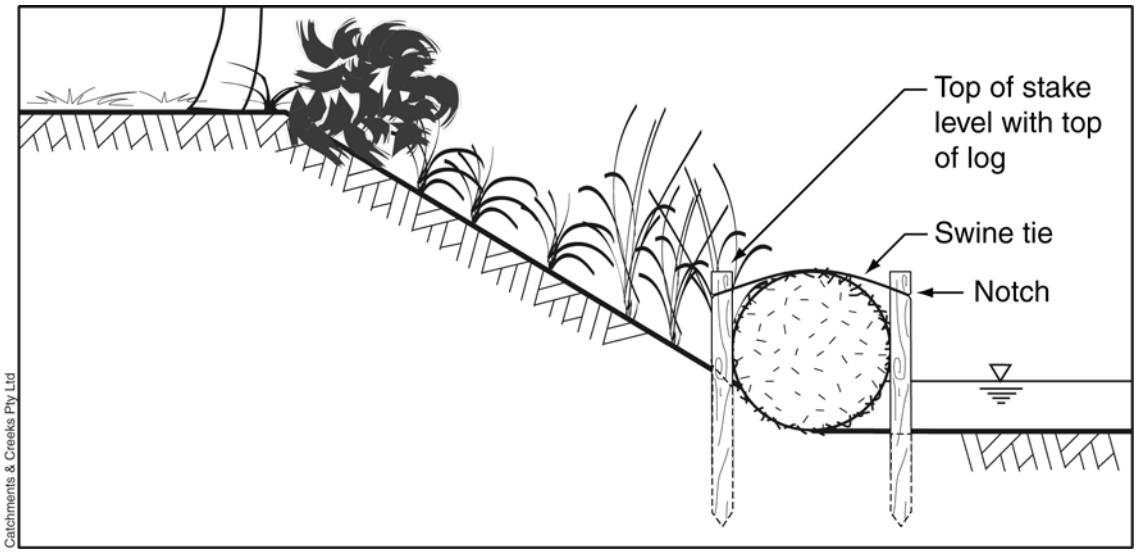

Figure 1 – Typical placement of geo log at toe of stream bank

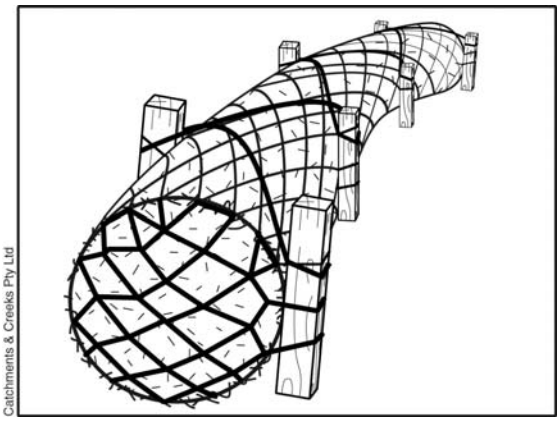

Figure 2 – Typical anchorage of geo log

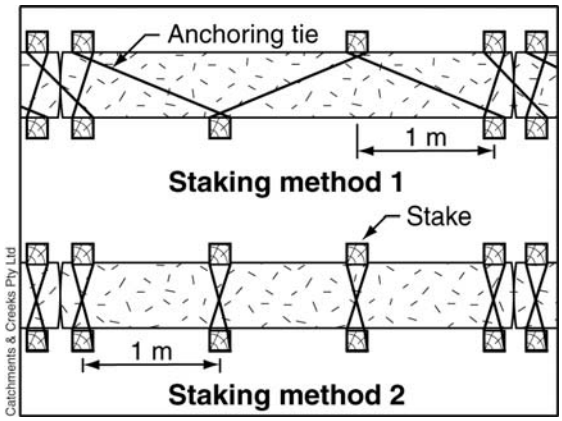

Figure 3 – Various methods of stake placement

Photo 3 – Significant bank erosion adjacent the geo logs (note, stakes at correct height, but wrong spacing)

Photo 4 – Significant bank erosion adjacent the geo logs (note, stakes sit too high above top of logs)

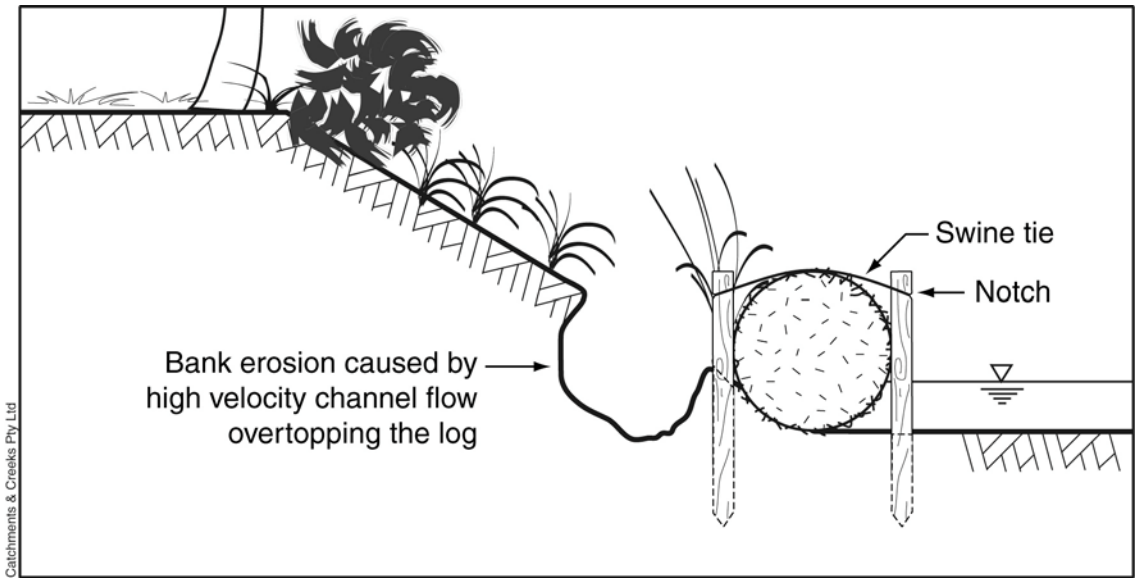

Figure 4 – Example of potential bank erosion caused by high velocity channel flow overtopping the logs before bank vegetation is full established

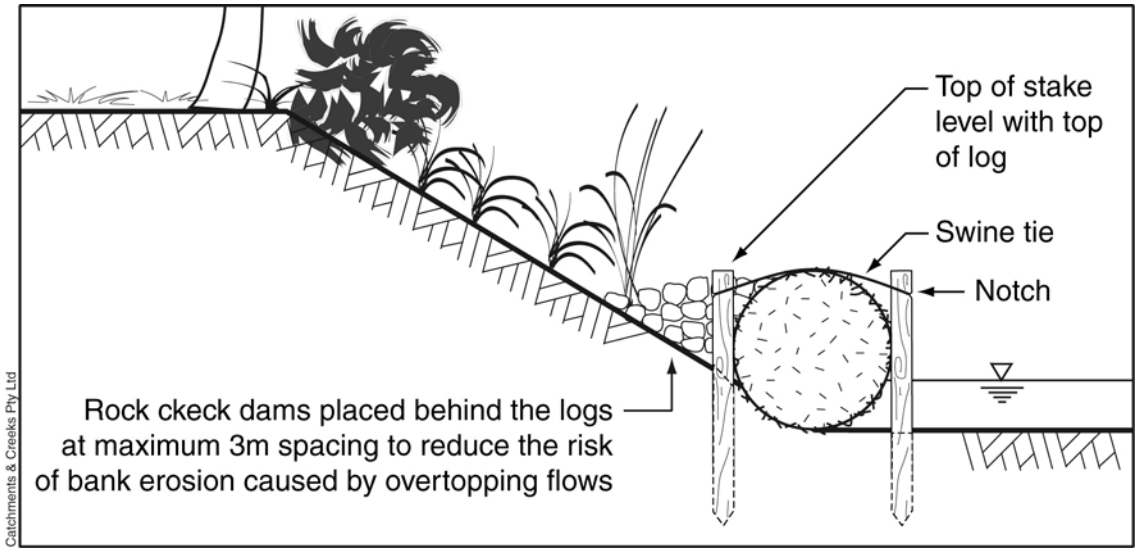

Figure 5 – Optional placement of rock check dams to reduce the risk of bank erosion behind the logs caused by overtopping stream flows

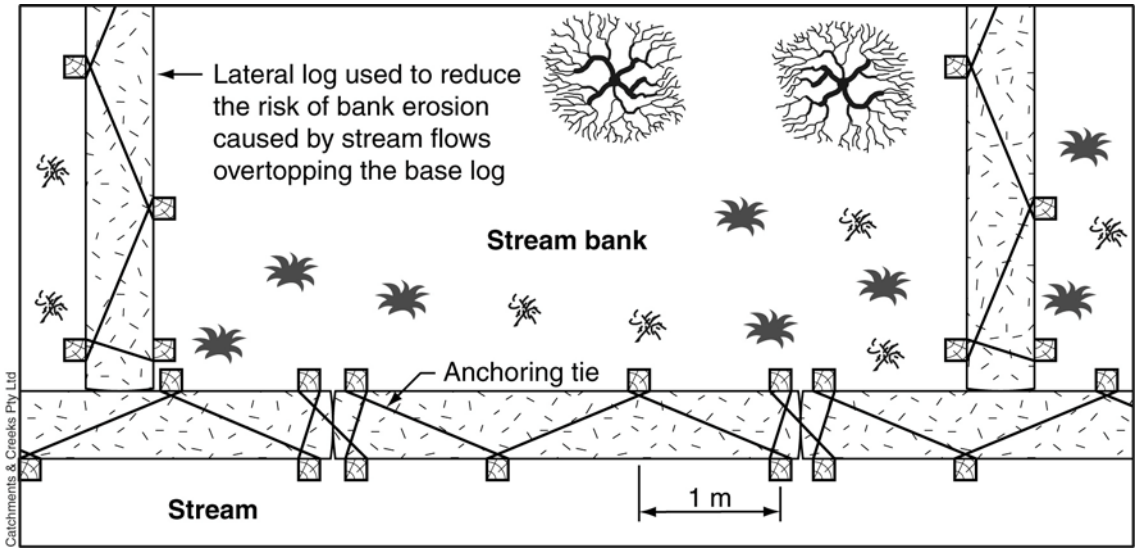

Figure 6 – Optional placement of lateral logs to reduce the risk of bank erosion

Description

Geo logs are large diameter, densely packed, 100% biodegradable tubes bound together with netting. They are typically manufactured from jute, coir (coconut fibre) or a combination of both.

Also known as *Coir Logs* or *Coconut Fibre Rolls*, with coir being the most common material used in their manufacture.

Purpose

Uses include:

- Temporary protection of shorelines from minor wave action during revegetation programs.
- Temporary protection of the lower channel bank from minor stream flows (such as snowmelts) during the plant establishment phase.
- Temporary stabilisation of steep batters (such as on the outside of a channel bend), and sand dunes.
- The temporary diversion of surface flows off tracks and trails (i.e. used as a drainage cross-bank).
- Temporary flow control check dams within deep drainage channels.

Limitations

Typical operational life of around 2–4 years depending on the moisture conditions. In continuously wet environments, operational life may be reduced to around 2 years. In very dry environments, operational life can exceed 4 years.

Advantages

100% biodegradable material allowing the logs to fully integrate with the landscaping.

Plants can be established within the logs.

The logs generally do not present a risk to aquatic or grown-dwelling wildlife.

Inexpensive compared to hard engineering solutions, but not as durable.

Can be used as a single row, or staked to create terraces.

Disadvantages

Provide only temporary erosion control and bank stability.

Once wet, coir logs can become very heavy and difficult to manoeuvre.

Geo logs have a low buoyant weight, and are not stable without suitable anchorage.

Common Problems

If stream flows are allowed to overtop the logs, then bank erosion can occur adjacent the logs (Figure 4 and Photos 3 & 4).

A common mistake is staking through the centre of a coir log rather than on either side.

It is not always possible to plant directly into the logs due to their poor water-holding capacity.

Special Requirements

Should be used only in situations where revegetation will provide all necessary long-term bank stability.

The logs must be secured properly.

The use of geo logs that contain non-biodegradable synthetic netting is not recommended in bushland and riparian areas.

Prior tom use, geo logs should be stored in a dry shed away from direct sunlight.

Location

Used in locations such as:

- streams subject to snow melts;
- rivers with boat traffic;
- outside of river bends;
- lake and coastal shorelines subject only to local wind and boat-generated waves;
- tracks and trails.

Site Inspection

Check for displacement of the logs.

Check for soil erosion adjacent the logs.

Materials

- Geo logs: manufactured from 100% jute, coir (coconut fibre) or a combination of both.
- Stakes: minimum 50 x 50mm x 0.9m hardwood. Stake length and width may need to vary slightly depending on the ground conditions.

Installation

1. Refer to approved plans for location and installation details. If there are questions or problems with the location, dimensions or method of installation contact the engineer or responsible on-site officer for assistance.
2. Prior to installation on channel/river banks, place a suitable erosion control mat over any area where the logs are to be placed above an exposed soil.
3. When placed across the invert of drainage channels, ensure the logs are placed such that:
   (i) The crest of the downstream log is level with the channel invert at the immediate upstream sock (if any).
   (ii) Each log check dam extends up the channel banks such that the crest of the check dam at its lowest point is lower than ground level at either end of the check dam.
4. When placed along a channel/river bank, do not recess the log more than 1/3 the log diameter into the bank.
5. Ensure the logs are placed tightly, end to end.
6. Where practical, the extreme ends of a row of logs should be rotated up the bank and secured well with stakes.
7. Secure the logs by driving the stakes between the outer netting and the core material each side of the logs and secured into the ground, not through the centre of the log.
8. Ensure the spacing of stakes (one on either side) does not exceed an interval of 1m.
9. Once driven into the ground, the stakes should ideally sit at least two-thirds below the ground and one-third above, and ideally sit flush with the top of the log.
10. Where directed, interlace coir rope, galvanised wire, or plastic tree ties between the stakes to provide additional anchorage.
11. Fill and shape behind the logs if required.
12. If stream flows are likely to overtop the logs, then take appropriate steps to prevent high velocity flow along the landward side of the logs. This can be achieved with the placement of rock checks at a spacing not exceeding 3m, or the placement of logs laterally up the channel bank.

Maintenance

1. While on-site works continue, inspect all geo logs prior to forecast rain, daily during extended periods of rainfall, after significant runoff producing storms or otherwise at weekly intervals.
2. Repair or replace displaced logs that are likely to cause erosion problems.

Post installation monitoring

1. Monitoring of works can involve several different techniques, such as photo point monitoring, aerial photographic monitoring, measuring plant survival and growth, and flora and fauna surveying.
2. Inspect and maintain geo logs after each high flow event for the first year. Maintenance may involve resecuring logs, replacing logs, and repairing breaks in the netting.
3. Any non-biodegradable or potentially hazardous materials (including hardwood stakes and synthetic twine or netting) should be removed once works have reached the end of their life.