NATURAL FIBRE LOGS
(a.k.a. Natural fibre wattles)

Natural fibre logs are a category of sediment control devices encompassing several products that are, like filter socks, applied for sediment removal from sheet flow or concentrated flows in swales. By decreasing flow velocities they promote gravitational settling of suspended sediments and help reduce runoff erosivity. They differ from filter socks in their material composition and the fact that they are pre-fabricated and not typically filled onsite. They are composed of various biodegradable natural fibres and are typically uniform throughout. Lengths and diameters vary according to the product type and manufacturer. Examples of natural fibre logs / wattles commonly used for ESC include:

- **Coir logs** | Coconut fibre encased in a coconut fibre twine netting.
- **Straw logs** | Agricultural straw typically encased in a tubular synthetic netting
- **Wood fibre logs** | Wood excelsior fibre (wood slivers) logs, typically encased in a tubular synthetic netting.

Figure B2-8: Natural fibre logs

Application

Natural fibre logs can be used in a variety of sediment control applications depending on their diameter, length and how they are placed/positioned. Common sediment control applications of logs include:

- As flow interruption on level and sloped areas where they are applied along contours, perpendicular to runoff sheet flows;
- At the base of slopes, at a recommended distance of at least 1.5 m from the based in order to provide adequate space for sediment deposition;
- Along the site perimeter in areas of sheet flow;
- Perpendicular to channelized flow in swales and ditches where they function as check dams;
- Around storm drain inlets receiving sheet flows;
- At the base of topsoil stockpiles;
- Around sediment bags as part of a dewatering treatment train;
- During frozen conditions in place of sediment fence that cannot be trenched in; and
- Any other areas where it is necessary to dissipate flow velocities and pond water to promote sediment settling.

Design and installation

Product specifications

- Biodegradable and non-biodegradable casings are available depending on the product and intended application. Where logs are being used for permanent stabilization, particularly for construction projects in natural water features, biodegradable casing can be a useful option. Confirm casing life span with the product supplier.
- Fibre material should be free of any refuse, weeds, contaminants or other materials toxic to plants, wildlife or humans. It should also be relatively free (<1% by dry weight) of inert or foreign man made materials.

Product performance

- Confirm removal efficiency of any natural fibre log product prior to applying it on the site. It is recommended that products are selected that can demonstrate sediment removal efficiency ≥ 70% based on testing by an independent third party. Where this removal efficiency cannot be verified, the products should only be used in low risk applications, and not applied as the primary barrier protecting an adjacent natural feature.
- Sediment retention testing should be carried out using American Society for Testing and Materials (ASTM) Standard D7351-13, which is the “Standard Test Method for Determination of Sediment Retention Device Effectiveness in Sheet Flow Applications”.

Sheet flow applications

- For optimal performance, upslope area draining to the log should be stabilized, particularly if the application is on a slope.
- Logs applied as sediment control for runoff sheet flow - e.g. at site perimeter, along contours of sloping areas, around storm drain inlets - should be sized such that flows from most storm events will not overtop the logs.
- Consult with supplier for guidance on selecting appropriate log diameter based on slope grades and lengths and the design storm which is meant to be treated. In general, the sizing should be based on the 5 year design storm, however sizing for a larger design storm may be necessary if logs are being applied to protect adjacent natural features.
- Prepare the ground surface prior to log placement to ensure good ground contact. Creating a shallow depression in which to place the log can help to improve ground contact.
- Place logs on level contours to ensure they receive sheet flows rather than concentrated flows.
- Where logs are applied at the base of a slope, a distance of at 1.5 m from the base is recommended in order to provide adequate space for sediment settling.
- Install logs perpendicular to the sheet flow path and install with ends turned upslope to discourage water from flowing around the ends.
- For slopes steeper than 2H:1V, multiple parallel logs may need to be installed on the slope to dissipate runoff energy and reduce the risk of rill erosion.

- Secure logs by staking them into place with long wooden stakes driven into the centre, or alternatively on both sides if tearing of the casing is a concern. Where ground below is paved, secure with heavy concrete blocks or other appropriate means to ensure good ground contact and discourage shifting.
- Stakes should be driven into the ground at least 20 cm and extend above the height of the log.
- Stakes should be placed at regular intervals as needed to secure the log, with intervals varying based on the sock diameter and the slope of the drainage area. Confirm appropriate spacing with supplier.
- Consult with supplier to confirm recommended staking procedures, including staking depths and stake placement.

Concentrated flow applications:

- Natural fibre logs can be used as sediment control check dam structures to treat concentrated flows in small open construction site channels like interceptor swales.
- For use of logs as check dams, consult with supplier for guidance on selecting appropriate log diameter based on the design storm to be treated. In general, the sizing should be based on the 5 year design storm, however sizing for a larger design storm may be necessary where there is a low tolerance of risk of failure.
- Treatment of larger flow volumes should be addressed by selecting the largest log diameter that is recommended for the swale and reducing the spacing interval between logs. Stacking logs may also help increase capacity but should be decided on based on supplier guidance.
- Spacing of logs in the swale is based on the swale gradient and anticipated flows. Consult with supplier for guidance on optimal spacing along the swale.
- Prepare the ground surface prior to device placement to ensure good ground contact. The log should be pressed in to the ground during installation. Creating a shallow depression in which to place the log can help to improve ground contact.
- The log should be installed in the swale in a U-shape with ends pointed slightly upslope to encourage water to pond and – during large events – overtop the log in the middle rather than around the sides. The log should be long enough to extent to the top of the swale.
- As a minimum, stake into place in the centre and at both ends. To avoid damage to the casing, stakes can instead be placed on either side of the log to create a brace. Stakes should be driven into the ground at least 20 cm and extend above the height of the log.
- For best results, swales in which natural fibre logs are installed should be stabilized.

Inspection and maintenance

- Inspect all logs weekly, and before and after significant rainfall (see definition in Section 10.1.2) or snowmelt events, and keep a record of the inspection.
- Look for any signs of erosion and areas where water is undermining the log and consider how positioning, ground contact or flow rates can be adjusted to prevent continued undermining.
- Inspect positioning and placement of logs to ensure they haven't shifted substantially. Re-position and re-stake as needed.

- Where flows are exceeding the retention capacity of the log (e.g. frequent overtopping, water flowing around check dams), re-consider log diameter used, add additional logs (for swale applications) or stack them to create a higher barrier.
- Where logs continue to fail on an ongoing basis, consider replacing with an alternative sediment retention device. If failure is a result of concentrated flows being directed to logs being applied for sheet flow control, consider re-designing surface water flow paths to reduce volumes being directed to the problem area.
- Sediment and/or debris accumulation behind logs should be removed before it reaches approximately 30% of the log height.
- Any repair or maintenance needs identified should be repaired within 48 hours or sooner if natural receptors are at imminent and foreseeable risk of adverse impact. Higher priority should be assigned to repair of logs installed upgradient of natural features.

Decommissioning

- Remove and properly dispose of accumulated sediment.
- Where desired, and if fill material is not contaminated, some types of logs may be cut open so that fill can be used onsite as mulch for restoration works.
- Remove and dispose of any non-biodegradable material.