# BC Timber Sales
## Use of Log Bundle Culverts for Water Management Guide

*The use of log bundles as a temporary water management structure is an accepted practice in the BC forest sector. Log bundles are an economical method to provide seepage and low flow water passage and have traditionally been used during frozen periods on non-fish-bearing streams, non-classified drainages (NCDs), and areas of seepage. They are not intended for use during periods of higher flows or during snow melt (freshet). Careful planning, construction, and removal is necessary to meet environmental performance measures. Regular monitoring is required to ensure the temporary structure is performing as intended and to address environmental risks due to blockage or failure. The instructions below are intended to provide planning, construction, monitoring and removal guidance.*

## Planning:

The planning phase should include a vision for when and where to use a log bundle, and indicators for removal or replacement. **A functioning log bundle structure is defined as one which maintains natural drainage effectively, controls sedimentation and supports temporary use of trail or road**.

*Where:*

- Acceptable on S6, non-classified drainages (NCDs), and wet areas of seepage.
- Not acceptable on fish bearing streams, S5 non-fish bearing streams, and classified S5, S6 or NCDs that are direct tributary to fish bearing or streams used for domestic purposes *(drinking water, fire prevention, irrigation).*

*When & How:*

- **For temporary use as short term water management structure only**.
- For consideration as water management options during periods of low flows, such as during frozen periods up until snow melt.
- Acceptable for use as cross drains.
- To be removed before spring snow melt/freshet.
- Stream channels and banks need to be protected, and their integrity maintained.
- The number of logs required will be determined by the shape and size of the channel or cross drain.
- Plan for regular monitoring to ensure the structure is performing as intended.
- Field decisions to change a planned corrugated metal pipe (CMP) to a log bundle requires a change of plan and falls under the practice of professional forestry.

## Construction:

Being aware and utilizing proper construction techniques will help ensure log bundle structure functionality and mitigate impacts to drainage and resource features.

- A separation layer such as a geotextile, jute, burlap or another material, **must be used above and below the logs** to keep the voids between the logs clear and unobstructed from earth fill (road surfacing material), allowing water to pass freely amongst the logs.
- Logs are to be placed to a minimum depth of two (logs) to allow flow between adjacent top and bottom boles. A single row is not recommended because the flow capacity is provided by adjacent boles.
- Logs are to be abutted/touching against one another. Logs as a single unit do not provide any flow capacity.
- Logs can be placed within a channel/draw to limit the amount of earth fill required.

- Consider lashing the logs together with steel cables so the bundle can be lifted into place as a single unit, and to aid in deactivation. Lashed logs also prevent any single log from becoming embedded in the channel or bank.
- Logs should extend beyond the toe of the fill to provide an easy entry point at the inlet for seepage and low flows, and to train the flow away from the road prism at the outlet.

Photo #1: Log bundle built two or more logs high with a separation layer placed over the top to prevent the voids from becoming filled with road surfacing material. The bundle was used to allow low volume flow through a road in a wetland. Note the logs extend past the edge of fill to allow water to easily enter or exit the structure.

Photo #2: Use of three log and separation layer to maintain void to ensure water to pass freely.

Photo #3: Use of log bundles at NCD

## Monitoring and Removal

All water management structures used along resource roads require inspection. Temporary log bundles are no exception and need to be inspected frequently for functionality, collapse, erosion and sedimentation, and adherence to timing of removal. Indicators to watch out for include:

### *Monitoring*

- Signs of erosion, sedimentation, and or ponding water are indicators that the log bundle is not functioning properly and should be removed or reconstructed or replaced with a CMP.
- Where water is present, structure should allow flow to pass through unrestricted without inlet backup.
- Ensure adequate fill is used over the log bundle so the structure is not exposed on the running surface.
- Monitor during/after periods of high rainfall events, and or when wet weather thresholds are met.

### *Removal*

- Remove log bundles prior to freshet and other periods of high flows, and prior to demob of equipment.
- Ensure stream channel and banks are protected.
- Lashing log bundles during installation will be helpful during removal.
- Apply grass seed to exposed soils post removal.
- Separation layers to be disposed of accordingly (waste).
- Discarded logs to be removed to outside the riparian management areas and other water seepage features.

Photo #4: *Example of a log bundle location within a NCD showing that the structure was removed before snow melt and before flows increased; log bundles are most appropriate for predominantly dry channels with periodic seepage or low flow.*