

Use of temporary water management structures for non-fish bearing crossings: Log Bundles

The use of log bundles as temporary water management structures has been an accepted practice in the Skeena Business Area. Log bundles are an economical method to provide seepage and low flow water passage and have traditionally been used during frozen periods within dry channels with periodic seepage or low flows. They are not intended for use during periods of higher flows or snow melt (freshet). Their use as cross drains has included non-frozen periods when the ditch has minimal water. Planning and careful construction methods will help to meet environmental performance measures. Regular monitoring is needed to ensure the structure is performing as intended and to mitigate poor performance due to blockage or failure. The below instructions are intended to provide planning, construction, and inspection guidance and are expected to be implemented.

Planning:

The planning phase should include a vision for when and where to use a log bundle, and indicators for removal and or replacement. A functioning Log bundle structure is defined as manages water flow effectively, controls sedimentation and supports use of trail or road use.

Where:

- Used in a non-fish bearing stream AND in a non-domestic watershed.
- Acceptable on Non-classified drainages (NCD's) and intermittent streams s.
- Use is acceptable within an S6 stream (≤ 3 m wide) only during low flows; caution should be given to seasonal high flows.
- Not recommended on water features (classified S5, S6 or NCDS that are direct tributary to fish bearing or domestic streams

When & How:

- For temporary use as short term water management structure.
- Remove structure before spring snow melt / freshet.
- For consideration as water management options during periods of low flows, such as during frozen periods up until snow melt.
- Log bundles are not an open conduit (such as a culvert) and can only pass seepage and low volume flows amongst the boles of the logs. It is critical that the voids within the log bundle remain open to allow seepage and low volume flows. A separation layer is needed to keep material from infilling the voids.
- Log bundles can be used as cross drains.
- 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.
- Inspection is needed to ensure the structure is performing as intended and has not been compromised.

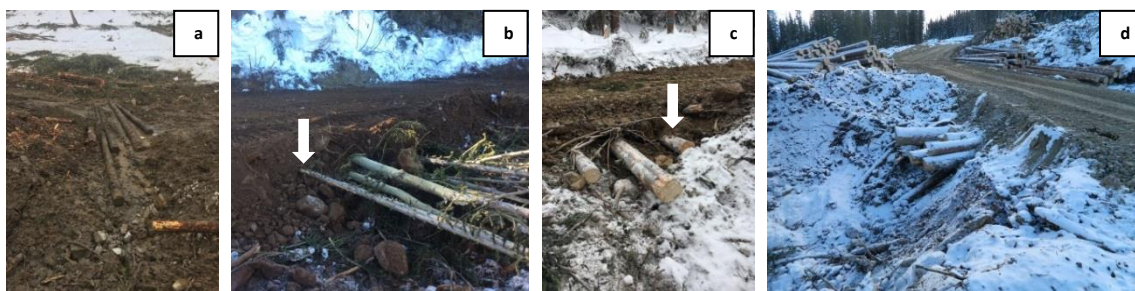


Example of a log bundle location within a NCD showing that the structure was removed before snow melt and before flows increased; log bundles are most appropriate for predominantly dry channels with periodic seepage or low flow.

Construction

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

- A separation layer should be used below the logs to protect the banks and channel of a stream.
- A separation layer must be used above the logs to keep the voids between the logs clear and unobstructed from earth fill (road surfacing material) to allow water to pass freely amongst the logs.
- Logs are to be placed to a minimum depth of 2 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 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.



Example of log bundle performance and construction practices; exposed log bundle (a) was built one log high without any separation layer. Examples b and c show independent / single logs (see arrows) which are not bundled and are infilled with soil which provides no flow capacity. Cross drain (d) has tightly abutted and bundled logs providing for flow.



Example of a log bundle built 2 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.

Monitoring

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

Indicators to Watch out for

- Ponded water over top structure indicates a lack of performance or poor choice of location. Where ponded water is present reconstruct or re-consider location and placement of the structure.
- Where water is present, structure should allow flow to pass through unrestricted without inlet backup.
- The log bundle should not be exposed.
- Erosion at the crossing, or near to the crossing due to flowing water should be addressed by use of live (seed, plants) or inert (rock, matting, logging slash, straw, filter cloth) cover. The use of cover is critical to prevent erosion or replacement with plastic or CMP.
- Sedimentation at the crossing should be contained and prevented from migrating from the immediate site (ROW width). Containment methods include detention ponds, barriers (silt fence, straw bales, etc.), and terracing effects. Sediment can have a negative effect on water quality and site productivity.
- Maintenance must be performed to remove sediment from any sediment capturing structure.



Exposed log bundle (left), ponded water (middle) and sedimentation (right) are examples of poor performance requiring mitigation; reconstruction, relocation, or choice of a different structure, such as a culvert, should all be considered.



Exposed log bundle (left) made from a single row of logs needs complete reconstruction, and sediment control is required at the outlet. Log bundle built 2 or more logs high (middle) shows the open voids between boles and a straw bale at the outlet acting as a check structure to contain sediment.