This guide provides guidance for equipment operators for construction of commonly prescribed road deactivation structures. Timber sale licence (TSL) holders and contractors can use this guide as a reference in achieving conformance to a prepared deactivation plan.

ACKNOWLEDGEMENTS

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PHOTO AND SCHEMATIC CREDIT

Cover photo and photo of erosion control courtesy of BC Timber Sales, Stuart-Nechako.

Schematics of staged removal of pipe culvert, cross-ditch installation, and waterbar installation courtesy of Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

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Ministry of Forests, Lands, Natural Resource Operations and Rural Development

FPInnovations

Forest Road Deactivation: Removing Culverts and Installing Cross-Ditches and Waterbars

A PRACTICAL GUIDE FOR FOREST AND RESOURCE WORKERS

November 2020

This guide can be downloaded and printed from fpinnovations.ca

BACKGROUND AND INTENT

The information in this brochure can be used by equipment operators who are responsible for seasonal road maintenance and permanent road deactivation operations. BC Timber Sales promotes training and education towards sound environmental practices.

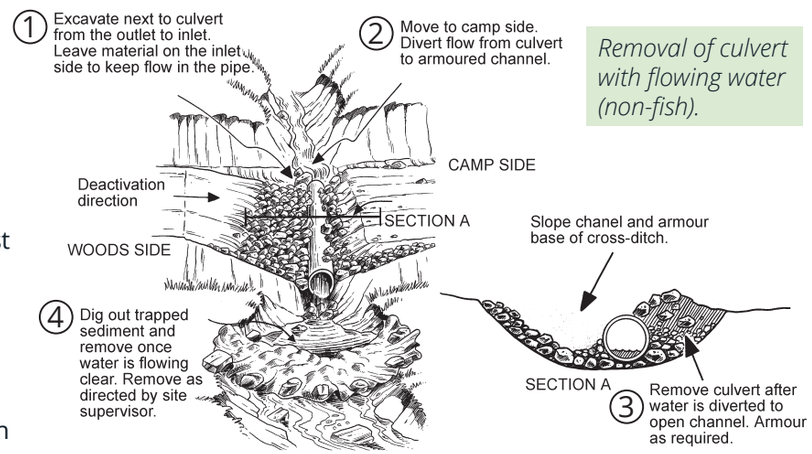
Over the life cycle of a Timber Sale Licence (TSL), the tenure holder is legally responsible for managing any negative effects of soil exposure and water. This responsibility may have to be considered daily, seasonally during road maintenance, or at the termination of a TSL. When a licensee intends to be inactive for a period— when precipitation/snowmelt can be expected or prior to spring freshet when increased water flow can be expected—temporary deactivation is required which includes removal of temporary crossing structures, including log bundles, to maintain surface drainage patterns during this time. Deactivation for water management is critical for maintaining surface drainage patterns so that they are consistent with natural drainage patterns.

PERMANENT ROAD DEACTIVATION

Timber sale licensees in the Stuart-Nechako Business Area must submit a deactivation plan before the start of any work. The intent of road deactivation is to place the road in a self-maintaining state that will indefinitely protect adjacent resources. Common road deactivation techniques include dirt berms/barricades (vehicle access control), cross-ditches, waterbars, bridge removal, replacing cross-drain culvert with cross-ditch, log culvert removal, and outsloping/insloping road surface.

Stream culvert removal

During deactivation, culverts are removed and replaced with cross-ditches. To protect the aquatic habitat and water quality, sediment management during culvert removal must create the least amount of sedimentation as possible. Sediment management should be stated in the deactivation plan; challenging sites or those with connectivity to fish habitat or water supply will increase the need for sediment control. Improved sediment control can be achieved by temporarily diverting flow to dewater the site before construction starts. In all cases, install sediment control downstream prior to the start of any earthworks at the site.



Removal of culvert with flowing water (non-fish).

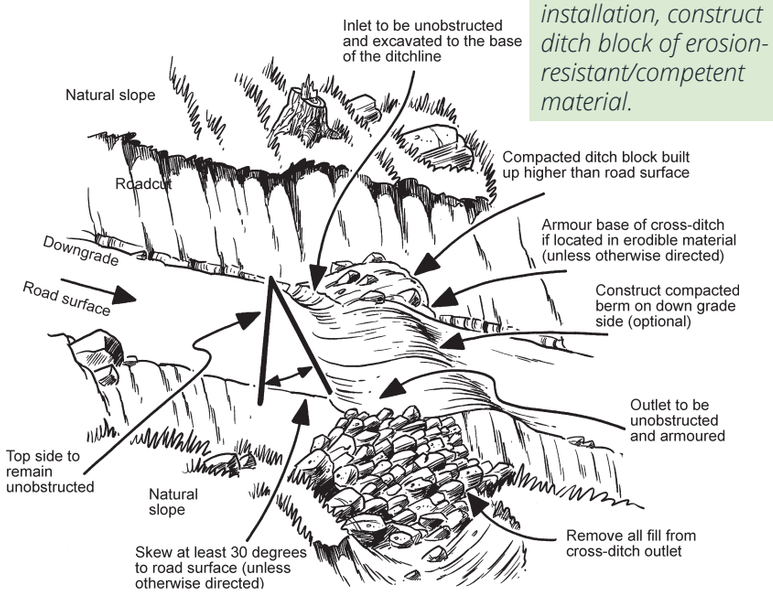
Cross-ditches and waterbars

A well-constructed cross-ditch will intercept and direct ditch and road surface water off and across the road. A ditch block directs water flow into the cross-ditch. The ditch block prevents water flow from continuing down the ditch, so it must be constructed from erosion-resistant/competent material. A waterbar also intercepts road surface water but not ditch water and is constructed without a ditch block. Waterbars can be constructed to divert road surface water either off the road towards the fillslope, or off the road into a ditchline (reverse waterbar). Final

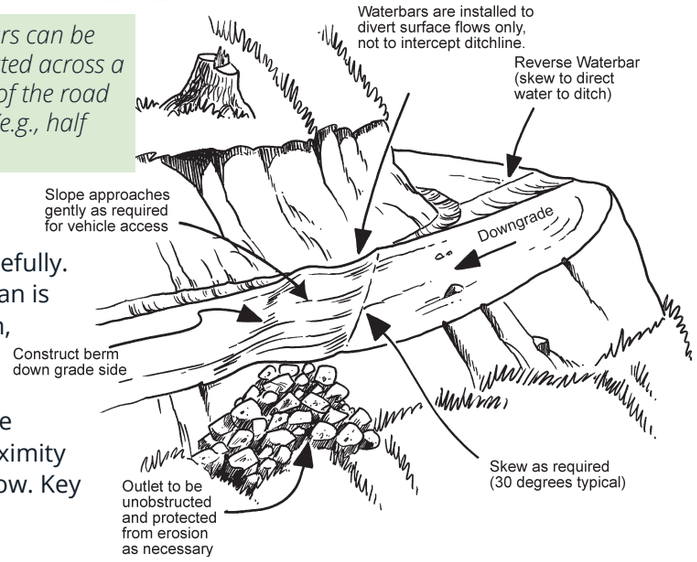
construction of either needs to permit safe traverse by all-terrain vehicles (ATVs).

Spacing and location of cross-ditches and waterbars are site specific depending on road gradient and soil type. Cross-ditches are often located where culverts have been removed. The location of either can be planned to reduce the length of a long continuous road surface to intercept and divert water flow off the road. Either structure can be located at the approaches to a stream to provide protection from sediment reaching the stream. Water should not be directed onto erodible or unstable slopes.

During cross-ditch installation, construct ditch block of erosion-resistant/competent material.



Waterbars can be constructed across a portion of the road surface (e.g., half width).



Bridge removal A deactivation plan for a bridge removal will be site specific and should be followed carefully. If any part of the bridge removal plan is unclear or needs further discussion, contact the author of the plan. Bridge removal has a high potential for negatively affecting the aquatic environment due to its proximity to the stream channel and water flow. Key considerations for bridge removal:

- The deactivation plan must clearly describe any need for equipment to cross the stream and how it will be strategically accomplished. No equipment can be in the stream without authorization.
- Use a temporary access structure (e.g., skid bridge or deck module) for equipment crossing.
- No soil originating from deactivation works can be introduced to the stream.
- Backslope the abutment material to a stable angle.
- Contour ground and ditches so water does not run into the stream. Direct flows onto the forest floor.
- Plan for ATV access for forest workers.
- Abutment logs can be planned to be left in place to help terrace the slope and contain sediment, and eliminate any erosion potential associated with their removal.

Log culverts and bridges As with bridge removals, the deactivation plan for log culverts needs to be carefully developed and followed. Sediment must be prevented from entering the stream. Fill between the stringers can be challenging to remove with the bucket of an excavator; hand shovels can be used, or a rubber tire can be grasped by the excavator to sweep between the stringers. A separation layer can be placed below the structure to contain any sediment that falls. Cargo nets lined with a geotextile have been used successfully.

Erosion control Erosion prevention can be achieved by providing cover to exposed soils (e.g., rock, vegetation, and logging debris) and/or providing rough and terraced surfaces. Containment of the eroded sediment can be achieved by slowing movement of sediment and promoting deposition of the fine soil through detention (e.g., sediment catchment basin). Seeding soon after soil exposure will establish a vegetative cover and a shallow root system; seeding is a cost-effective means to prevent erosion.

To promote seed germination, soil can be loosened by scarifying the surface which provides a favourable microenvironment of shade and moisture retention. Erosion control mats, made from fibres of coconut, straw, or wood, also provide protection from rainfall impact and erosive forces. Mats provide an environment to promote seed germination when seed is spread on the soil and the mat is placed above.

Erosion prevention and sediment containment can be achieved by ensuring approach slopes at deactivated locations are sufficiently gradual to ensure a self-sustaining state to minimize future erosion; establishing grass and legume vegetation rapidly on exposed soils; and utilizing sediment containment measures (e.g., silt fences, catch basins, and check dams).

Access management Deactivated roads should be barricaded to prevent access by motor vehicles other than ATVs. Berms built from local earth and rock are the preferred form of barricade. All access berms must be clearly marked and visible to all traffic.