

Section 8 - Road Management PRINT Binder

(letter size paper except where noted)

[Forest Road Deactivation Culverts FPC Guide Nov2020](#) (legal size)

[Licensee Road Use Agreement Contact List_Current02Feb17](#)

[Temporary Winter Stream Crossings FPC Guide](#) (legal size)

[TSL Having a Plan Bulletin 22Sept2015](#)

[TSL Seeding Guidelines for TOC July 2019](#)

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

FPInnovations worked in close cooperation with BC Timber Sales, Stuart-Nechako Business Area during the development of this guide. Existing guides that pertain to the theme of deactivation include *The Construction and Rehabilitation of Purpose-Built Skid Trails on Steep Slopes* and *Temporary Winter Stream Crossings: A Practical Guide for Forest Workers*.

REFERENCES

B.C. Ministry of Forests. (2001). *Best management practices handbook: Hillslope restoration in British Columbia*. Victoria, B.C.: Res. Ten. & Eng. Br., B.C. Min. For.

B.C. Ministry of Forests. (2002). *Forest road engineering guidebook* (2nd ed.). Victoria, B.C.: For. Prac. Br., B.C. Min. For.

B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development. (2019). *Engineering manual*. Retrieved from <https://www2.gov.bc.ca/gov/content/industry/natural-resource-use/resource-roads/engineering-publications-permits/engineering-manual>

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.

FOR MORE INFORMATION

Ken Yorston, RFT
Woodlands Supervisor, Engineering
BC Timber Sales, Stuart-Nechako Business Area
ken.yorston@gov.bc.ca

Eric Ravnaas, RFT
Engineering Technician
BC Timber Sales, Stuart-Nechako Business Area
eric.ravnaas@gov.bc.ca

Clayton Gillies, RPF, RPBio
Senior Researcher, FPInnovations
clayton.gillies@fpinnovations.ca



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.

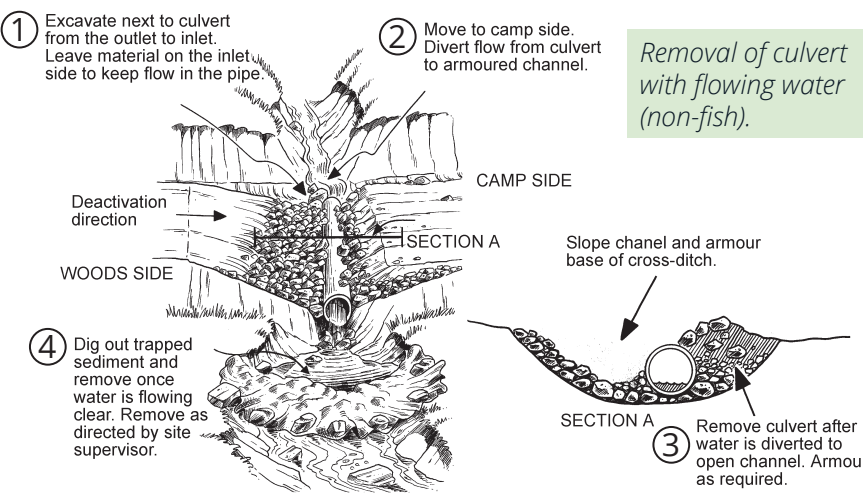
Over the life cycle of a Timber Sale Licence (TSL), the tenure holder is legally responsible for managing any negative effects of soil exposure and water. This responsibility may have to be considered daily, seasonally during road maintenance, or at the termination of a TSL. When a licensee intends to 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.



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.

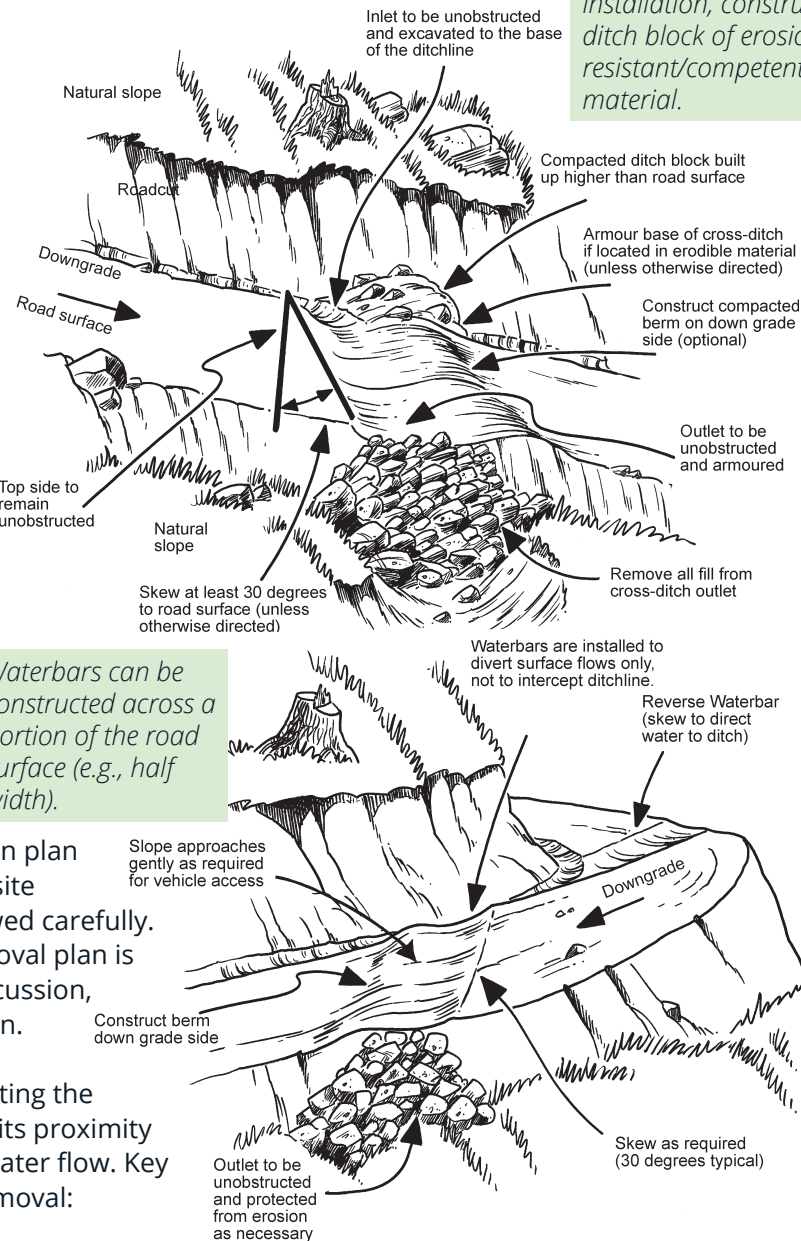
Waterbars can be constructed across a portion of the road surface (e.g., half width).

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.



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

- 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.



OKANAGAN-COLUMBIA BUSINESS AREA ROAD USE AGREEMENT CONTACT LIST

Licensee	Contact	Number
Weyerhaeuser Company Ltd PO Box 39 Okanagan Falls, British Columbia V0H 1R0	Shawn Byrne, RPF	Phone: 250-295-4266 Fax: 250-295-3287
Canoe Forest Products Ltd. Box 70, Canoe BC V0E 1K0	Shawn Rolston, RFT ATE	Phone: 250 833-1242 Cell: 250 463-5699
Tolko Industries Ltd 4280 - Highway 6 Lumby, BC V0E 2G7	Dana Schepp	Phone: 250-547-1293 Fax: 250-547-1274
Louisiana-Pacific Canada Ltd. Malakwa Division 4872 Lybarger Road Malakwa, British Columbia V0E 2J0	Logging And Roads Supervisor	Phone: 250-836-5212 Fax: 250-836-3215
Gorman Bros. Lumber Ltd. P.O. Box 26052 West Kelowna, British Columbia V4T 2G3	Logging And Roads Supervisor	Phone: 250-768-5131 Fax: 250-768-2822
Downie Timber P.O. Box 800, 1621 Mill Street Revelstoke BC, Canada V0E 2S0	Logging And Roads Supervisor	Phone: 250-837-2222 Fax: 250-837-2200
Louisiana-Pacific Canada Ltd. P.O. Box 170 800 - 9th Street North Golden, B.C. V0A 1H0	Logging And Roads Supervisor	Tel: 250-344-8800 Fax: 250-344-8801
RCFC Holdings Ltd. P.O. Box 3199 Revelstoke BC Canada V0E 2S0	Logging And Roads Supervisor	Phone: 250-837-5733 Fax: 250-837-5988
Stella-Jones Canada Inc. 4661 60th St SE Salmon Arm, British Columbia V1E 1X2	Logging And Roads Supervisor	Phone: 250-832-1180 Fax: 250-832-7933

Effective Date: February 2, 2017

FPIInnovations prepared this guide in order to provide forest workers with information on winter stream crossings. FPIInnovations worked in close cooperation with BC Timber Sales, Stuart-Nechako Business Area during the development of this guide. Reference material for this guide included the *Reduced Risk Timing Windows and Measures for the Conservation of Fish Habitat for the Omineca Region* (BC Ministry of Water, Lands and Air Protection, 2004).

For more information about the use or intent of this guide,

please contact:

Carol Byers, RFT

carol.byers@gov.bc.ca

For more information about the development of this guide,

Please contact:

Clayton Gillies, RPF, RPBio

FPIInnovations

Tel.: 604 224 3221

clayton.gillies@fpinnovations.ca

This guide can be downloaded and printed from

www.fpinnovations.ca



A PRACTICAL GUIDE FOR FOREST WORKERS

The essence of a temporary crossing is that it will be utilized for a short period of time. This guide will help forest workers choose preventative measures that will help maintain stream and stream bank integrity.

Best practices

Goal is to minimize any damage to the stream channel, banks or vegetation in the vicinity of the work area

Plan your work

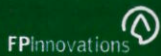
Choose a crossing location with the following characteristics:

- Narrow stream width
- Straight section of stream; not meandering or braided
- Solid, stable stream banks and bed that are less susceptible to erosion or degradation

Crossing structures

- Temporary clearspan is desirable in all cases for protection of stream channel
- A log bundle can be used during frozen conditions or where there is no flow
- A culvert can be used if there is flowing water
- Other structures may be considered provided they adhere to the same principles outlined in this guide

follow us on:



© 2014 FPIInnovations. All rights reserved. FPIInnovations, its marks and logos are trademarks of FPIInnovations.

Temporary Winter Stream Crossings

A PRACTICAL GUIDE FOR FOREST WORKERS

fpinnovations.ca

Avoid crossing at wide, braided or meandering section.

Wheeled equipment is not permitted to cross exposed channels. All refueling and servicing must be done outside of the riparian management area.

Choice of allowable crossing structure will depend on stream classification and flow characteristics.

Be aware of the goals set for the riparian management area at/near the crossing.

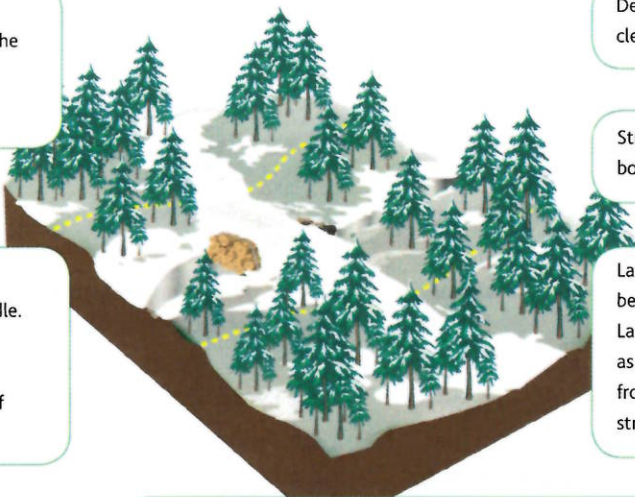
Crossing of an exposed channel by tracked machines is only permitted where stream banks and channel are stable (i.e. rock or frozen) and there is no risk of damage. If these conditions are met, tracked machines may cross the exposed stream in order to aid with construction of the crossing (see crossing consideration section).



CONSTRUCTION AND INSTALLATION OF A LOG BUNDLE

Place a protective layer (typically geotextile) over the stream banks, channel and bundle.

Use clean snow to fill the channel above the log bundle. Mineral soil should not be mixed with snow which is used for the construction of the crossing.



Delimb and top bundled logs, and clean them of excess soil and debris.

Stream must be frozen to bottom of channel with no flow.

Lash logs together so bundle can be lifted into place as a single unit. Lashed logs will aid in deactivation as well as prevent any single log from becoming embedded in the stream bank or channel.

The surface of the winter road at the crossing should be frozen and well-compacted to withstand the anticipated traffic and to prevent any exposure of the underlying structure. Compaction of snow may reduce its thickness up to 70%.

Deactivation

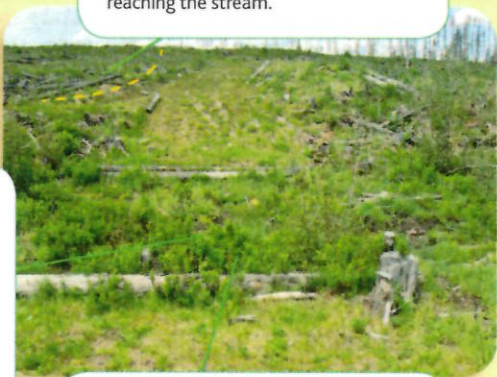
- Remove crossing when no longer needed. Structure must be removed before stream thaws and develops any water flow, or by April 15th, whichever is first.
- At all times damage to the stream channel and banks must be minimized. Vegetation in the vicinity of the work should be conserved as much as possible.
- Stabilize exposed soils at the crossing site and along the approaches.
- All permanent foreign (non-biodegradable) material is to be collected and removed from the site.
- To aid in the complete removal of geotextile used as a separations layer, it should be specified that the material be of a high grab tensile strength in order to be pulled and gathered without ripping. Grab tensile strength is measured in newtons (N) and for woven geotextile has a typical range of 700 to 1400 N.

- A separation layer made of biodegradable material which can be left in place to degrade may be appropriate for use where retrieval is especially difficult.

All foreign material is to be collected and removed from the site

Preserving the natural vegetation next to the stream helps to protect this highly vulnerable area from erosion and sedimentation.

Redirect ditch or surface flows from reaching the stream.



Cribbing or logs used as abutments which are stable or embedded into the ground may be left in place.

CROSSING CONSIDERATIONS

Stream and riparian classification

STREAM WIDTH	STREAM AND RIPARIAN CLASS
Stream is a fish stream or in a community watershed	
>20 m	S1
>5 – 20 m	S2
1.5 – 5 m	S3
<1.5 m	S4
Stream is not a fish stream and not in a community watershed	
>3 m	S5
<3 m	S6

Note that S3 and S4 streams are the primary focus for this winter crossing guide.

*Number of stream channel crossings by tracked equipment during construction of crossing

- S4: Up to three one-way crossings
- S3: Up to two one-way crossings

*Only allowed if stream banks and channel are stable (i.e. rock or frozen) and there is no risk of damage to the stream banks or channel.

TEMPORARY CLEARSPAN

- Can be used to cross S3 or S4 streams.
- Can be used to cross streams with flowing water
- Can be installed without encroaching on stream channel
- Open bottom provides for debris passage
- Clearspan can provide best protection to stream banks and channel, and helps to preserve riparian vegetation / features
- Remove structure prior to spring melt



LOG BUNDLE

- Can only be used to cross S4 and S6 streams that have no flowing water
- Installation may only occur once the water course has frozen solid to the bottom
- Bundle must be tightly lashed so as to prevent any loose logs from being placed within the channel
- Lift bundle into place, which will aid to preserve the stream bank from any gouging due to rolling or dragging
- A separation layer is required for use over the banks, channel and bundle

- Use clean snow to place in channel and over entire crossing location
- Logs are the typical choice for use in a bundle; PVC pipe may be considered as an alternative
- Remove structure prior to spring melt
- A culvert amongst a log bundle allows for a larger conduit to be incorporated in the structure which may provide for a fail-safe due to an unanticipated flow event.



CLOSED BOTTOM CULVERT

- Can only be used for S4 and S6 streams
- Culvert needs to conform to the shape of the channel at crossing location—typically a straight stream reach is chosen.
- Separation layer is required for use over the banks, channel and culvert.
- Use clean snow to place in channel and over entire crossing location.
- Remove structure prior to spring melt.



Advisory Bulletin No. 2015/09/22 – Having a plan

Purpose

This bulletin provides information to staff and registrants regarding the requirement to have a plan while carrying out primary forest activities on a timber sale licence (TSL).

Definition

For the above purpose, *primary forest activities* as defined in section 1 of the Forest Planning and Practices Regulation, means one or more of the following:

- a) timber harvesting;
- b) silviculture treatments; or
- c) road construction, maintenance and deactivation.

Requirements

Before BC Timber Sales (BCTS) can auction a TSL or construct roads to access that TSL, the *Forest and Range Practices Act* requires a Timber Sales Manager (TSM) to first prepare and obtain approval of a Forest Stewardship Plan (FSP). Although there can be some variation between plans, all FSPs must specify the results and strategies that a TSM must prepare to meet the objectives set by government for applicable resource values (for example, for soils, timber, wildlife, etc.).

Once the FSP is in place the results and strategies are used to inform the layout and design of cut blocks and one or more Site Plans that must be prepared for every TSL. Site Plans identify the approximate location of the cutblocks and roads and identify how the intended results and strategies described in the FSP apply to the TSL. This last point is very important for TSL holders since section 106.2 of the Forest Planning and Practices Regulation (FPPR) requires the holder of a TSL who carries out primary forest activities on the cutting authority area to ensure that those activities are consistent with the intended results and strategies identified by the TSM and that relate to the TSL as described in the applicable FSP and Site Plan.

Pursuant to section 22 (g) of the Forest Act (i.e., general authority for a TSM to include terms and conditions in a TSL), TSLs now impose further planning-related requirements on the holder of the agreement. More specifically, in accordance with the requirements set out in the agreement, the TSL holder must have a plan when carrying out primary forest activities and the TSL holder must provide the TSM with a copy of that plan, including any amendments to the plan, if requested.

New Plan-related TSL clauses

The following clauses have been added to all newly issued TSLs:

- 4.10 The Licensee must have a plan that covers primary forest activities on the cutting authority area prior to commencement of primary forest activities.
- 4.11 The Licensee must amend the plan referred to in paragraph 4.10 before the Licensee intends to conduct primary forest activities in a way that is different from what is described in the plan.
- 4.12 The Licensee must submit the plan or amendment referred to in paragraphs 4.10 or 4.11 if requested by the Timber Sales Manager.

Plans

BCTS prepares other “plans”, for example harvest plan, harvest plan map, site plan supporting information, and a road layout and design (if applicable), which are made known as part of the tender package that contain recommendations regarding how the TSL holder could conduct primary forest activities in a manner that will likely achieve the intended results and strategies.

It is a recommended best practice that TSL holders use the information in the Site Plan, Harvest Plan, Harvest Plan Map and road plans/profiles (if applicable) that BCTS provides in the Tender Package as their “plan” for conducting primary forest activities. If the TSL holder chooses to not follow the “plans” provided, it is recommended that the TSL holder seek advice from a qualified person on how to plan for and to carry out primary forest activities consistent with the identified results and strategies.

The TSL holder’s plan should contain sufficient amount of detailed information (in written and map format) to provide guidance to the workers on how to carrying out primary forest activities for the area. The content of “plans” should include all the elements necessary to allow harvesting rights to be undertaken to meet the legislative, regulatory and results and strategies for the area.

Contacts

Further details regarding this bulletin; please contact your local timber sales office.

Guidelines for seeding as required in BCTS Timber Sale Licence agreements, Road Permits, road construction contracts and other BC Timber Sales projects.

BC Timber Sales -Okanagan Columbia Business Area – July 2019

This document provides guidance for staff, Licensees and contractors on how to effectively seed areas as required in your BCTS Timber Sale Licence, Road Permit or contract and as required under the approved BCTS Forest Stewardship Plan. For specific guidance on seeding for specific sites please consult your BCTS staff representative.

WHERE TO SEED – All areas of exposed soil greater than 0.01 ha of contiguous exposed soil must be seeded. For example, 0.01 ha equates to exposed soil 10 m x 10 m. Seed only where existing vegetation has been removed and mineral soil exposed. Areas with existing vegetation or areas of unsuitable substrate such as rock should not be seeded.

WHEN TO SEED – Seed exposed soil as soon as possible after disturbance to achieve the best results in establishing/re-establishing desired vegetation. Seed the first fall or spring after the disturbance or sooner if possible. Further delay results in seedbed crusting, lowers success in establishment of seeding and allows undesirable weeds to become established. You must seed no later than one year after the completion of timber harvesting or road construction.

HOW MUCH TO SEED – Seeding rates and seed mixes are dependant upon the specific objective to be achieved. Too much, too little or the wrong kind of seed can waste time and money, may not achieve the desired objectives, or provide negative consequences to native plants or reforestation objectives. Consult your BCTS field technician for site specific advice.

Erosion control – 10 Kg/ha

For areas where erosion control is the prime objective seed at a rate of 10 kg/ha using an erosion seed mix. Highly erodible soils are characterized by steep slopes, fine textured soils, areas with moderate to high precipitation and long uniform topography. There may be high values at risk such as community watersheds, fisheries sensitive streams or riparian areas.

Landing and Road Right of Ways – 5 Kg/ha

These areas are generally not scheduled for reforestation. The primary objective is soil rehabilitation and prevention of the spread of invasive plants and other noxious weeds.

Rehabbed skid trails and other in-block disturbance – 3 Kg/ha

These areas are generally planned for reforestation and excessive seeding can impact reforestation objectives. Seeding objectives include providing forage for cattle use and cattle distribution, soil rehabilitation and the prevention of the spread of invasive plants and noxious weeds.

HOW TO SEED – A simple hand cyclone seeder is normally the best means of applying the seed.

A 50 m by 50 m landing equates to 0.25 ha. At a rate of 5 Kg/ha you should be applying approximately 1.25 Kg of seed for this size of landing.

One kilometre of cyclone seeded strip approximates 0.4 ha (average width of 4 meters). Seeding road right of way at 5 Kg/ha you should be using approximately 2 kg of seed for every 1.0 km of cyclone seeded strip. Seeding rehabbed skid trails at 3 Kg/ha you should be using 1.2 Kg of seed for every 1.0 km of cyclone seeded strip.

WHAT TO SEED – You must only use seed certified as grade Canada No 1 or Common No. 1 Forage Mixture. Do not use seed mixes that are not certified to this level. A reputable seed supplier will be able to supply certified seed and various seed mixes to meet the objectives.

Sample seed mixes

Dry IDF Mix

Species	% by weight
Perennial ryegrass	25
Crested wheatgrass	15
Orchardgrass	15
Chewings fescue	10
Hard fescue	10
Alfalfa	25

Wet IDF, MS, ESSF

Species	% by weight
Perennial ryegrass	55
Orchardgrass	30
White clover	15

Erosion

Species	% by weight
Perennial ryegrass	32
Creeping red fescue	5
Canada Blue Grass	4
Western wheatgrass	35
Timothy	4
White clover	20