Kruger
Pulp and Paper

Corner Brook Pulp and Paper Ltd.

Erosion and Sediment Control Plan

Version 3

June 2026

Contents

1.0 Introduction

Effective erosion and sedimentation control is an essential component of responsible forestry operations in Newfoundland and Labrador. The province's forest landscapes—characterized by rugged terrain, shallow soils, abundant wetlands, and a dense network of streams—are particularly sensitive to disturbances that can accelerate soil loss and degrade water quality. Forestry activities such as road construction, timber harvesting, site preparation, and equipment movement have the potential to expose soil and alter natural drainage patterns. Without proper planning and mitigation, these disturbances may lead to increased erosion, sedimentation of waterways, habitat degradation, and reduced long-term forest productivity.

This Erosion and Sedimentation Control Plan (ESCP) outlines the strategies, best management practices (BMPs), and operational procedures designed to minimize soil disturbance and protect water resources during all phases of forestry operations. The plan is developed in alignment with provincial legislation, guidance from the Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture, SFI® Forest Management Standards and guidance from the Department of Fisheries and Oceans, and Water Resources.

The purpose of this ESCP is to:

- Provide clear direction for preventing, controlling, and monitoring erosion and sedimentation risks.
- Ensure the protection of streams, wetlands, fish habitat, and downstream water users.
- Support compliance with environmental regulations and forest management certification standards.
- Promote operational efficiency by reducing the need for costly remediation and road maintenance.
- Contribute to the long-term sustainability and resilience of forest landscapes.

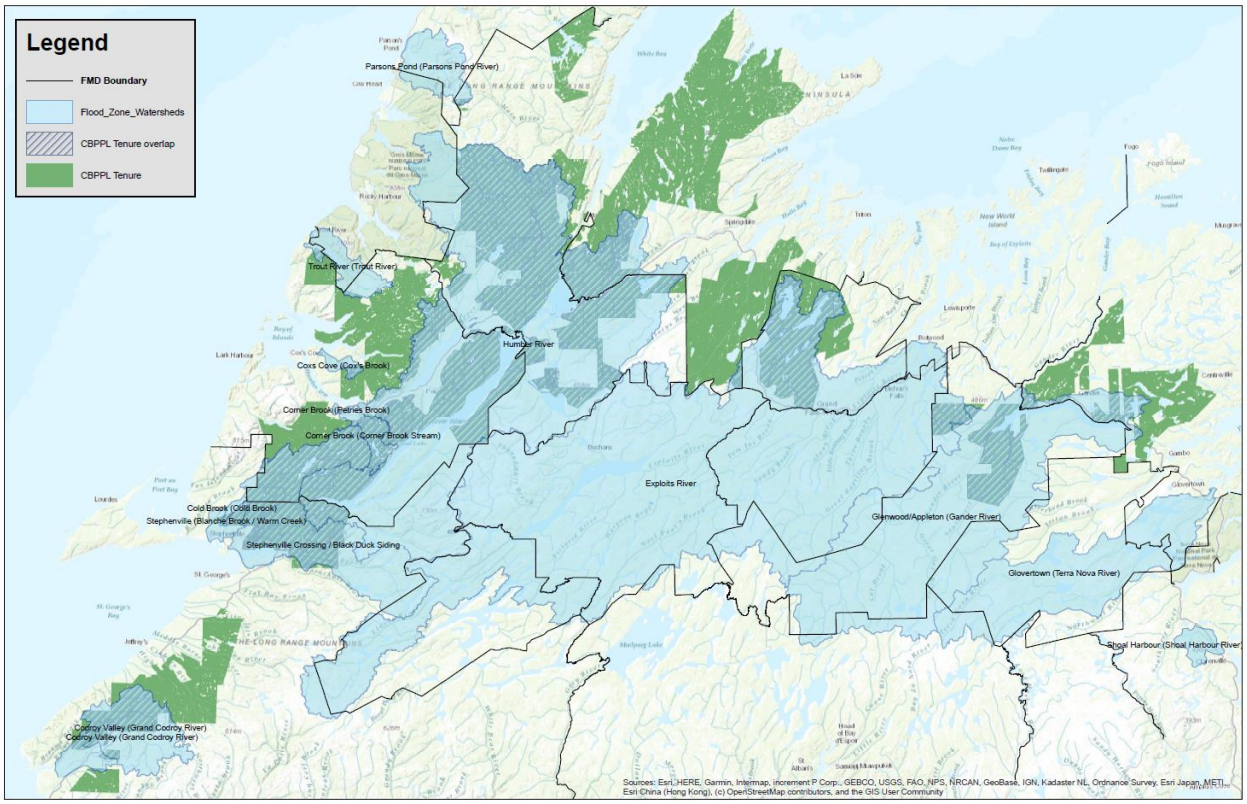
By implementing the measures described in this plan, forestry operators can maintain high environmental stewardship standards while supporting the economic and social benefits that the forest sector provides to communities across Newfoundland and Labrador.

2.0 Flood Plain Areas

A floodplain is the low-lying land adjacent to a river that is periodically flooded. There are several flood plain areas which overlap with CBPPL's defined forest area. Table 1 below shows the area and the size of each of these flood plain areas and Figure 1 depicts CBPPL tenure, overlaps and flood plain areas.

Table 1 Flood Plain Areas overlapping with CBPP Tenure

Name – River System	Area (km^2)
Exploits – Exploits River	10,988.41
Humber – Humber River	7,991.68
Glenwood/Appleton – Gander River	4,231.46
Stephenville Crossing/Black Duck Siding	1,677.87
Codroy Valley – Grand Codroy River	657.96
Parsons Pond – Parsons Pond River	391.22
Trout River	264.62
Corner Brook – Corner Brook Stream	158.24
Stephenville – Blanche Brook/Warm Creek	124.25
Cox's Cove – Cox's Brook	60.66
Cold Brook	25.35



Some of the larger area flood plains will be described in more detail in the following sections.

Exploits River Flood Plain

The Exploits River is the longest river on the island of Newfoundland, about 246 km long. It drains a very large watershed, approximately 10,988 km², the largest basin on the island. It flows from Beothuk Lake / Red Indian Lake system, through central Newfoundland (Grand Falls-Windsor, Bishop's Falls, Badger) and into the Bay of Exploits (Notre Dame Bay). Because of its size and internal lakes/reservoirs, the Exploits is a high-volume, regulated but still flood-prone river system.

The Exploits River floodplain is typical of a large interior river system, being a broad, low-gradient valley. The river valley is described as wide, shallow, and relatively flat. Floodplains extend significantly near Badger, Bishop's Falls and Grand Falls–Windsor.

Flooding on the Exploits River is primarily hydrologic (inland), unlike coastal systems. The main drivers being rainfall + snowmelt (dominant cause), basin size and runoff volume, ice jams and reservoir/dam influence.

Major flood events occurred in 1983, 2003 and 2026. These events caused evacuations, property damage and in some cases complete property loss. These events demonstrate that flooding is ongoing and cyclical, not just historical.

Humber River Flood Plain

The Humber River is one of the largest rivers on the island of Newfoundland. It flows about 120–150 km from the Long Range Mountains through Deer Lake and into the Bay of Islands at Corner Brook. The watershed (drainage basin) is ~7,991 km², making it the second largest basin on the island. Major components include the Upper Humber River and Grand Lake, which is regulated by hydroelectric operations at Deer Lake.

Because of its size and lake regulation, the river system strongly influences downstream floodplain conditions. For the Humber River floodplains are found mainly around: Deer Lake, Steady Brook, Humber Valley/Humber Village and the lower river near Corner Brook. These areas developed along the river since the early 1900s, increasing exposure to flooding.

Some of the key characteristics of these areas include wide, low-gradient areas near Deer Lake and downstream. They are influenced by snowmelt runoff, rainfall events and the water-level regulation from Grand Lake dam.

Flooding occurs almost every year, usually minor, however, major flood events have occurred, notably in 1969 and 1981. Flood watches are still common. For example, May 8, 2026, flood watch due to snowmelt + rain, with water levels nearing or exceeding riverbanks. Extreme precipitation can also trigger related hazards. In 2024 heavy rainfall (121 mm in ~4 days) led to flooding and landslides along the river in Corner Brook. This shows the floodplain is active and sensitive to weather extremes.

The river is actively monitored by the provincial government. Hydrometric stations measure and track water levels, streamflow, and snowpack and climate data. Forecasting models are used to predict flood conditions and issue warnings to communities. Communities most associated with the Humber River

floodplain include Deer Lake, Steady Brook, Pasadena, Humber Village, Nicholsville, and some areas of Corner Brook.

Glenwood/Appleton Floodplain – Gander River

The communities of Glenwood and Appleton are located on opposite banks of the Gander River. This area lies within the Gander River valley, a major central Newfoundland river system that drains to Notre Dame Bay. The river valley is broad and low-lying and characterized by alluvial (river-deposited) soils and is approximately 4,231 km²in size.

Development has occurred directly within active floodplain areas, especially along riverbanks. Like many Newfoundland communities, settlement followed the flat land areas which then allowed access to river transportation.

The Glenwood/Appleton floodplain has typical features of a mid-sized inland river system, which includes a wide, low-elevation landscape. Extensive areas adjacent to the river are low elevation and prone to seasonal inundation. Some areas are described as very low riverside terrain, especially in Glenwood. Minor flooding occurs almost every year in low-lying areas. This indicates a highly active floodplain, with regular overbank flow that occurs outside of extreme events.

Flooding in this area is primarily riverine (internal basin), not coastal and the main drivers are rainfall + snowmelt (dominant). Major floods occur when heavy rain falls on an existing snowpack and temperatures remain above freezing. This in turn produces rapid runoff and high peak flows.

While major floods are less frequent annual minor flooding does typically occur.

Stephenville Crossing/Black Duck Siding

Stephenville Crossing is built on a low, flat coastal floodplain at the head of St. George's Bay. The floodplain is associated primarily with Harry's River system (including Bottom Brook and Southwest Brook) and coastal processes from storm surge from St. Georges Bay. The area includes Stephenville Crossing (town centre) and the adjacent community of Black Duck Siding. Much of the land is low elevation (some areas <5 m above sea level), wetland or former marsh. The combination of river delta + coastal barachois (sand barrier lagoon) creates a naturally flood-prone landscape. The flood plain is approximately 1,677 km² in size.

Flooding here is multi-source, making it more complex than inland systems like the Humber. The main drivers being heavy rainfall + snowmelt, coastal storm surge, ice and debris jams and drainage constraints. The region has experienced multiple floods over decades, and flooding is considered a persistent, long-term hazard and not a rare occurrence.

Trout River

The community of Trout River is located on the west coast of Newfoundland and inside Gros Morne National Park. The floodplain includes lower Trout River (from Trout River Pond to the coast) and

Emmanuel's Brook and Feeder Brook tributaries. The flood plain is relatively small, ~264 km² in area and is a small coastal river floodplain, very different from large inland systems like the Exploits.

The Trout River floodplain is a narrow coastal valley system with localized but significant flood risk. Flooding is strongly affected by Emmanuel's Brook and Feeder Brook. These smaller channels can overflow quickly and can trigger localized flooding hotspots.

Flooding in Trout River is multi-source, with several key processes including ice jams, rainfall + snowmelt, surface runoff/steep terrain and coastal effects (secondary factor).

The following sections of this plan outline all the pre-planning and operational procedures that are used to mitigate or lessen the impacts of harvesting and road building, in sensitive areas such as flood plains.

3.0 Operational Planning – Season and Site Selection

Seasonal timing and careful site selection are critical to minimizing erosion and sediment transport during forestry operations. Activities will be scheduled when necessary, during dry or frozen conditions to reduce soil disturbance and limit rutting, compaction, and surface runoff. Areas with saturated soils, steep slopes, or highly erodible soil types will be avoided during sensitive periods, particularly during spring melt or heavy rainfall seasons, or scheduled for cut when these conditions are lessened.

As there is limited information on soil types for most of the province the use of past harvest experiences is also considered when determining the season to cut.

Landings, and access routes will be located on stable terrain with adequate drainage characteristics, while buffer zones will be maintained near waterways and sensitive wetland areas. Buffer widths will vary depending on the waterbody type.

By aligning operational timing with site-specific conditions, the project reduces erosion risks and supports long-term soil stability and water quality protection.

4.0 Standard Operating Procedures

Corner Brook Pulp and Paper Limited Woodlands has developed a number Standard Operating Procedures (SOP's) which originally stemmed from our ISO 14001 certification, and since then have become the core documentation for all operations in the forest. They have been developed for Harvest, Planning, Road Building, Silviculture, Safety, and General Operations.

Specifically for Erosion and Sediment Control, Table 1.0 details out the SOP's have been developed.

Table 2 Erosion and Sediment Control SOP's

Category	SOP Name	Rationale
Harvesting H-01 Version 7	Cutting extraction trails through buffers and installing temporary forwarder crossings	To properly locate and cut a right-of-way through a riparian zone and install and remove temporary forwarder crossings associated with the extraction of fibre, so as to prevent the sedimentation of streams during and after use.
Harvesting H-02 Version 4	Harvesting adjacent to sensitive areas	To protect the soil integrity and water quality of sensitive areas during harvesting operations.
Harvesting H-03 Version 3	Controlling erosion and rehabilitating extraction trails	To prevent the erosion of extraction trails during and following harvest operations which could otherwise degrade the site and/or cause sedimentation of waterbodies.
Harvesting H-04 Version 4	Minimizing soil erosion in harvesting and forwarding operations	To prevent the erosion of soil from extraction trails during harvesting operations, which could otherwise degrade the site and/or cause sedimentation of waterbodies.
Harvesting H-05 Version 9	Roadside storage, loading and transporting wood	To maximize fibre recovery from roadside storage areas, minimize fibre losses during loading and transportation, and protect water quality in nearby waterbodies.
Harvesting H-07 Version 2	Preventing soil damage and slash management during skidding operations	To protect the soil integrity and water quality of sensitive areas during harvest operations.
Planning PL-01 Version 7	Determining buffer requirements for unmapped streams	To ensure the proper and consistent buffering of streams that do not appear on a 1:50,000 scale NTS map (unmapped streams).
Roads R-01 Version 10	Installation and removal of temporary stream crossings for winter roads	To ensure proper installation of winter crossings to protect water quality.
Roads R-02 Version 12	Culvert and pipe arch installation	To ensure proper installation of culverts and pipe arches associated with road construction, to prevent sedimentation of streams.
Roads R-03 Version 4	Winter road construction	To ensure the proper construction of winter roads, to prevent or minimize erosion and sedimentation during spring run-off.
Roads R-04 Version 4	Road construction methods – Cut and Fill	To ensure the proper construction of roads in areas of undulating topography.
Roads R-05 Version 5	Road construction methods – Favourable terrain	To ensure the proper construction of roads in areas of favourable ground conditions.
Roads R-06 Version 3	Road construction methods – Building over wet terrain	To ensure the proper construction of roads in wet or low-lying areas.

Roads R-08 Version 5	Deactivating roads and stream crossings	To ensure the proper removal of stream crossings and drainage structures on road networks that will not be maintained in the future.
Roads R-09 Version 4	Road construction methods – Steep side-hill terrain	To ensure the proper construction of roads in steep side-hill terrain.
Roads R-10 Version 9	Ballast and borrow pit operations	To minimize the disturbance of soils and prevent the degradation of water quality during ballasting operations.
Roads R-11 Version 4	Grading forest access roads	To ensure the maintenance of forest access roads through proper grading techniques and environmentally sound practices.
Roads R-12 Version 5	Open-bottomed structures for large crossings	To maintain natural stream characteristics, minimize the disturbance of soils, and prevent this degradation of water quality during the construction of open-bottomed structures for large crossings.
Silviculture S-01 Version 3	Maintaining water quality on scarification projects	To ensure that woody debris, slash and soils do not enter waterbodies because of scarification.

SOP's are reviewed and updated frequently by staff at CBPPL Woodlands. Most updates are driven by regulation changes or external audit comments. We strive to keep SOP's current.

All SOP's referenced in the above table can be found in Appendix A.

With reference to SOP PL-05, District planners prepare operational maps which are given to contractors before they move into a new area. These maps have the buffers represented using some of the criteria found in Table 2 and Table 3. These criteria may be taken from multiple sources which are listed.

Table 3 Buffer Requirements and Criteria Description taken from Best Management Practices Protection of Freshwater Fishes. Recommended minimum buffer zone requirements for activities near water.

Activity	Recommended Buffer [associated reference]
Urban development	15 m[d]
Recreational cottage lot development	30 m[e]
Land disturbance (i.e., timber cutting, silviculture, roads, skid trails, landings, clearing of vegetation, etc)	20 m[a, b, c1, f]
	20 m + 1.5 x slope (if slope > 30 %)[a, b, c1, f]
	30 m[b] to 50 m[f] (near scheduled salmon rivers)
Grubbing	30 m[a, b, c1]
Piling	30 m[c1]
Reservoir clearing (i.e., hydroelectric)	15 m[f]
Quarries / Burrow pits	50 m[a] to 100 m[b, f]
Slash / Debris	30 m[c1] / above high water mark[a]
Camps	30 m[c2]
Fuel (< 25 L); storage / handling / use	15 m[b, f]
Fuel (< 2000 L); storage / handling	30 m[b, f]
Bulk fuel (> 2000 L); storage / handling / use	100 m[a, b, c1, f]
Equipment servicing / washing / refueling	30 m[a]
Blasting	200 m[b, c1, f]

a. Forestry: Environmental Protection Guidelines for Forestry Operations in Newfoundland and Labrador; Department of Fisheries and Land Resources, 2018.
b. Linear Development: TL 267 Overland Transmission Environmental Protection Plan; Nalcor, 2016.
c1. Mining: Environmental Protection Plan Big Triangle Pond Mineral Exploration Resource Access Road and Associated Mineral Exploration Activities; Eagleridge International Limited, 2015.; c2. Mining: Mineral Act, 2014.
d. Urban: The 1994 Development Regulations; City of St. John's, 2020.
e. Rural: Remote Recreational Cottage; Fisheries, Forestry and Agriculture webpage, 2021.
f. Hydroelectric: LITL Vegetation Protection and Environmental Effects Monitoring Plan; Nalcor, 2014.

Table 4 Recommended minimum buffer zone requirements for activities near Protected Water Supply Areas

Protected Water Supply Area	Recommended Buffer Widths*
Intake Pond, Lake, or Reservoir	Minimum 150 m
River Intake (for a distance of 1 km upstream and 100 m downstream)	Minimum 150 m
Main River Channel	Minimum 75 m
Major Tributaries, Lakes or Ponds	Minimum 50 m
Other Waterbodies	Minimum 30 m
Petroleum Products	**Regulatory Requirements***
Refueling	150 m
Tank storage	500 m

*Government of Newfoundland and Labrador, 2021.

The latest version of the Environmental Protection Guidelines can be found in Appendix within the 5YP.

Other buffers and restrictions may come in the form of permit requirements, Five-year plan conditions and our own Environmental Certification standards.

5.0 Sediment and Erosion Controls in Place

CBPPL requires that erosion control measures be used to reduce the chances of erosion or sedimentation of waterbodies. Erosion control measures permit water to run off on the down hill side of the extraction trails, allow water carrying sediment a chance to be filtered as it travels over the surrounding vegetation, and filters sediment out of water before it reaches any waterbody.

Common measures include careful road layout to follow natural contours, minimizing slope steepness and disturbed areas. Proper road building techniques using BMPs are also forms of control of sediment. Roads are constructed as to provide methods for water management including proper ditching, cross drains, water bars, and culverts installations. These are used to safely divert surface runoff and reduce water velocity, preventing soil from being carried away.

Preventative actions are being taken all throughout the year as extreme weather events are more common throughout the entire year. Contractors will either shut down operations or move operations as the weather dictates. Preventative actions are logged and discussed in bi-monthly meetings with all contractors operating on the landbase.

This plan does not include all SOP's used in our road building and harvesting operations but there is a large library of BMPs for various activities. It is expected that using these practices does provide controls to prevent erosion and sediment events.

6.0 Emergency Response Procedures

CBPPL Woodlands has built several Emergency Response (ER) Plans for our operations. They include:

1. Personal Incident Emergency Response
2. Fire
3. Fuel/Oil Spill
4. Sedimentation
5. Transportation Hazard
6. Powerline Contact
7. Lost Employee
8. Fatality

The following paragraphs outline the sedimentation emergency response plan from our ER Binder.

SEDIMENTATION EMERGENCY RESPONSE

Sedimentation is "when a waterbody that normally runs clear is discolored as a direct result of our activities".

Sedimentation Emergency Response Procedure

Sedimentation is the process of very fine sediment particles being carried by stream velocities and deposited in slower moving water. This material can be particularly harmful to fish, fish and wildlife

habitat, and drinking water. This is why it is essential to reduce the effects of sedimentation to a minimum. When sedimentation is suspected on a job site the following steps should be taken:

1). Determine the cause of the sedimentation. Was it excessive rain, soft ground conditions or excessive topsoil, muddy water build-up on existing roads with potential to be splashed into ditches, or steep terrain?

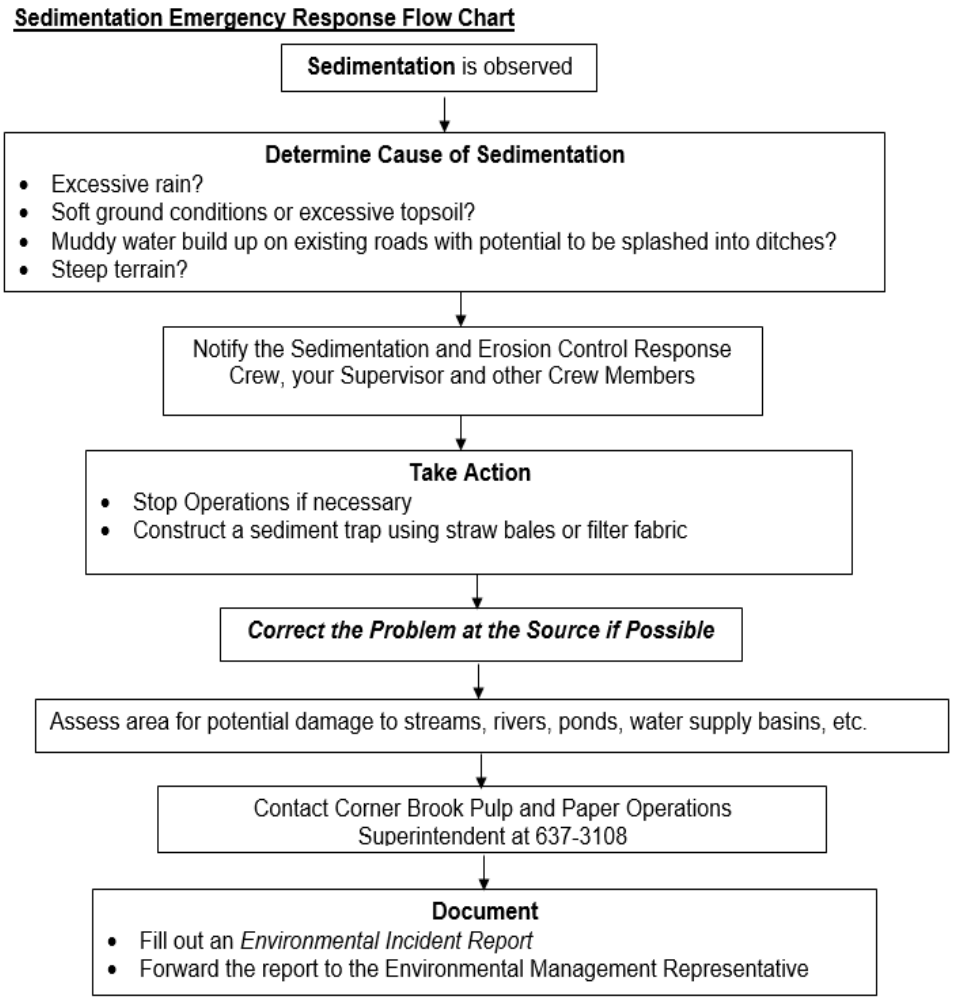
2.) Notify supervisor and other crew members.

3.) Stop operations if necessary. Construct a sediment trap using straw bales or filter fabric.

4.) Assess the potential for environmental damage to streams, rivers, ponds, water supply basins, etc.

5.) Fill out an Environmental Incident Report and forward it to the Environmental Management Representative.

6.) Contact Corner Brook Pulp and Paper Operations Superintendent at 637-3108.



EMERGENCY RESPONSE REQUIREMENTS & EROSION CONTROL FOR SEDIMENTATION

Many harvesting areas are prone to erosion. Corner Brook Pulp and Paper require its contractors to have sediment control materials on site to mitigate the potential impact of its activities. Harvesting contractors are required to have a minimum of 10 bales of hay always stored on their job sites, for use in stabilizing soils, filtering sediment-laden water, or mitigating some other environmental problem. Straw bale sediment traps offer an inexpensive and effective sediment control device. The purpose of the straw bale structure is to provide a short-term dam in a drainage ditch. The water velocity behind the bale is reduced such that sediment settles out and clean water flows over the top.

To construct a straw bale sediment trap:

1) Excavate a trench the width of a straw bale and the length of the proposed barrier to a depth of 15 centimeters (6 inches).

2) Place the bales tightly together on their sides in the trench. Drive two wooden stakes through each bale deep enough to anchor them securely. Wedge loose straw as a filler between any cracks.

3) Backfill and compact the excavated soil against the barrier.

7.0 Emergency Response Drills

ER Team members are listed for each jobsite. Emergency documentation can be found on all jobsites with team members listed. One of these employees (usually the foreman) will be available and trained to play the lead role in emergency situations. It is the contractor's responsibility to communicate the names of the team members to all employees, so they know whom to call in the event of an environmental emergency. The Emergency Response procedures are also reviewed with employees during worksite orientation.
Company employees, contractors and their employees will implement Emergency Response Plans based on their responsibilities and activities.

ERT drills promote:

- How to use the Emergency Response Procedures manual
- Emergency Response procedures for fire
- Emergency Response procedures for oil/fuel spills
- Emergency Response procedures for sedimentation
- Emergency Response procedures for medical crisis

EMERGENCY RESPONSE TRAINING
Is included in the Qualified Logging Professional training program which is required by CBPPL for all its woodland employees. The program is also promoted to Crown Lands contractors who are supplying fibre to CBPPL. This promotion is a requirement of our Sustainable Forest Initiative (SFI®) Fibre Sourcing Standard.

Tests (Exercise) – Emergency Response tests (Exercise) are performed to ensure employees and contractors have the knowledge and skills necessary to effectively respond to an Environmental Emergency. These will constitute the "hands-on" segment of the training. These tests will be conducted periodically to ensure Emergency Response Plans are effectively implemented.

Woodlands staff or contractors will conduct tests throughout the year. Contractors will conduct Emergency Response tests on their own jobsites. Emergency Response tests are scheduled to ensure all operations and all emergency situations as per above are tested.

Some guidelines given to contractors and Woodlands Staff in helping to conduct the test:

- Persons conducting test should include as many employees as possible in the test; remember the main reason for doing the test is to make all employees aware of the Emergency Response Plan/Procedures and who to contact in the event of an emergency.
- After the test is complete, review the Emergency Response Plan for the section tested (i.e. fire) with employees. Check to see if they followed the procedures and if they have any recommendations on how to improve the plan.
- Complete the test report form – include details of your observations and recommendations.

Contractors must be prepared to report on the test at scheduled Environment Health & Safety (EHS) operations meetings after it has been assigned and completed.

- Take plenty of photos –submit them to the EMR (EMR) – we will use them for discussion when the report is reviewed at the EHS meeting.

Each contractor, supervisor or woodlands staff member will forward the report and photos to the Environmental Management Representative and report on their test to all workers during a safety chat and at the next Monthly Operations meeting. All Emergency Response Plans will include provision for communication with off-site Emergency Response Agencies. Emergency Response Plans are controlled documents and will be implemented for all incidents and/or activities that could lead to significant adverse environmental impacts.

An example of a completed Emergency Response test completed in 2025 can be found in Appendix B.

8.0 Significant Environmental Aspects

An environmental aspect is an element of an organization's activities, products, or services that can interact with the environment. A significant environmental aspect is an environmental aspect that has or can have a significant environmental impact.

CBPPL Woodlands has established and implemented a procedure to identify its Environmental Aspects and identify those aspects which are significant and over which it has control, while considering a life cycle perspective. The life cycle ends with the delivery of fibre to the mill.

The purpose is to utilize the identified environmental aspects as a basis for implementing its environmental management system. Consideration was given to normal and abnormal operating conditions and the potential for reasonably foreseeable emergency situations. The identification of environmental aspects and impacts is essential in determining the relationship between the environment and business considerations and decisions.

The environmental aspects and impacts for harvesting and road building are found in Appendix C. Each activity is listed with the normal and abnormal conditions with each of the aspects and impacts of that given activity.

From this list our Significant Environmental Aspects were identified. Currently there are 4 of them.

1. **Release to water and land** – Fuel spill, garbage, water quality

2. **Natural resources management** – Fibre recovery, fibre utilization, biofuel, Logs, Pulp, Visual quality.

3. **GHG emissions & Climate Change –** Soil disturbance (compaction, rutting & erosion), transportation of round wood.

4. **Fire** – Forest fire

Programs are developed for each aspect to improve outcomes. For the release to water and land a fuel handling awareness program was rolled out in 2025. Programs are normally developed from monitoring data collection, such as inspection data from CBPPL's own inspections or from Crown inspections by GovNL Conservation Officers.

The Environmental Management System is the backbone of all operations, and it is used in all aspects of CBPPL operations on the tenure.

9.0 Water Resources Blanket Permit and Annual Reporting

Corner Brook Pulp and Paper have always been diligent in getting all the proper permits for water crossings on its landbase. In 2002 the company requested a blanket permit from the Department of Environment (DOE) for all crossings identified in our 5YP's. The department provided us with a blanket permit for culvert installations 2000mm in diameter or less and for bridges 5m wide in span and under. We have been receiving this permit from DOE since that time. Annually a schedule of installations is sent with payment for the bridge, culvert and forwarder crossings that were installed the year prior.

Included with the payment schedule is a completion report. It includes a spreadsheet of the installed crossings, maps of their locations and before, installed and removal pictures where applicable.

10.0 Monitoring, Inspections and Indicators

As part of CBPPL Environmental Management System (EMS) all company managed woodlands activities that have the potential to create significant environmental impacts will be measured and monitored. This is performed to ensure compliance to legal requirements, voluntary and non-voluntary agreements.

In addition, monitoring and measuring is performed to track performance, relevant operational controls, and conformance to the Company's environmental objectives and targets – including SFM Performance requirements, as well as to evaluate effectiveness. The core inspections that are completed are known as #1, 2 and 3 Inspections. Each will be described in this section.

#1 Inspections – Month End Check-in – Active Operations

All woodlands contractors are required to complete a #1 Inspection on their areas once per month. An example of this inspection is found in Appendix D. Inspections can be completed on paper or within our electronic SiteDocs reporting system. It is meant to be a quick check on the most important Environmental and Safety aspects of the job. This form also contains other reportable information that the company requires monthly.

#2 Inspections – Active Operations

Throughout the calendar year it is a requirement of CBPPL that all contractors undergo a #2 inspection. This inspection covers all aspects of our Environmental Management and Safety expectations. The inspection forms can be found in Appendix E.

Inspections during active operations allow the company to observe and correct in the moment.

Superintendents (or designate) and required Woodlands Supervisors document deficiencies from #2 EMS Compliance Inspections in a Directive Book that is kept on the job site. The Superintendent (or designate) / Woodlands Supervisor and Contractor review each directive; a date is assigned for each deficiency to be corrected. The contractor signs and dates the book when the deficiency is corrected and forwards a copy to the Superintendent (or designate)/Supervisor.

Review of the inspections takes place annually and decisions are made to improve on results collected the previous year.

#3 Inspections – Site Released

The intent of a Harvest Area Completion Inspection is to ensure that all operating areas are left in a state that minimizes any potential for a negative impact on the environment. The Harvest Area/Road Completion Inspection is conducted on each operating area by an Operations Superintendent, Roads Supervisor, or designate. When a contractor finishes up in a particular area (or portion of an area) and moves to another area, there are basic conditions that must be met before moving.

A map of the area inspected must be attached to the Harvest Area Completion Inspection. The following items are checked in this inspection:

2-0-8		Minor fuel/oil spills and stained soil cleaned up
3-0-1		Ditches free of debris or obstructions
3-0-2		No logging debris in waterbodies
3-0-3	3-0-4	Temporary crossings removed
3-0-4	3-0-5	Culverts free of debris or obstructions
3-0-5	4-0-2	Treed buffer zones maintained
3-0-6	4-0-7	No unnecessary trails or disturbance created by machines
3-0-7	4-0-9	Trails cut off (or rehabilitated if necessary)
3-0-8	4-0-10	Min. of 10 wildlife trees per ha. left on operating areas
3-0-9	5-0-5	Merchantable trees left on cutover/roadside landings
3-0-10	5-0-7	All merchantable timber cut in block
3-0-11	6-0-4	All garbage removed from site
3-0-12	6-0-6	Operations within approved operating areas

If problem areas are found the contractor must return to site and correct the issues. The minimum acceptable score is 100% and any deficiency is considered a failing score. The form used during #3 inspections can be found in Appendix F.

11.0 Appendices

Appendix A – SOP's Relating to Erosion and Sedimentation Control

Kruger Pulp and Paper
Corner Brook Pulp and Paper Limited

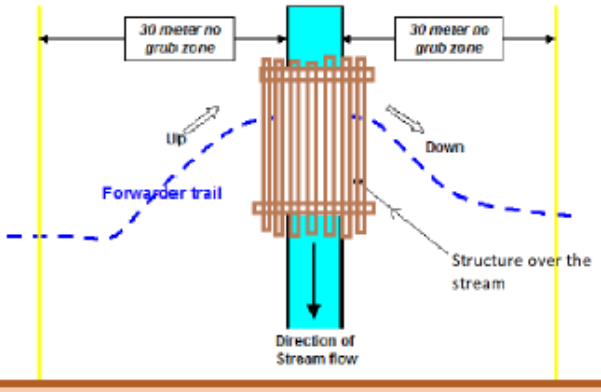
STANDARD OPERATING PROCEDURE
Woodlands H-01

This Standard Operating Procedure covers the Significant Environmental Aspects relating to: Release to Water and Land.

CUTTING EXTRACTION TRAILS THROUGH BUFFERS AND INSTALLING TEMPORARY FORWARDER CROSSINGS

Rational: To properly locate and cut a right-of-way (ROW) through a riparian zone, and install and remove temporary forwarder crossings associated with the extraction of fibre, so as to prevent the sedimentation of streams during and after use.

Background: Techniques for installing and removing temporary forwarder crossings vary depending on terrain and soil condition. Some crossings use steel or wooden structures placed over the streambed. This SOP will describe how to install temporary crossing across waterbodies, while still preserving the integrity of the streambed.



Contractor Data Collection Responsibility:

- GPS locations must be sent to District Planners and the Roads Superintendent along with the before pictures.
- Installed and removal pictures are required. This includes the stream banks and stream bed.
- Pictures are to be sent to Roads Superintendent throughout the year and in a timely manner.

Procedures:

The most important step in preventing sedimentation of streams is selecting the proper location for the crossing. Pick a narrow point in the stream with low approaches from both sides. Ensure the banks on both sides are stable. If the stream banks slope towards the brook, locate the extraction trail so it climbs up the hill on the approach, crosses the brook at a right angle, then falls down the grade on the other side. This will prevent sedimentation from traveling along the trail and entering into the stream.

Date produced: November 9, 2006	ISO 14001 Registered Environmental System	Version 7. Revised: Feb. 10, 2025

(Procedures continued…)

Ribbon the location of the extraction trail from the crossing to the end of the 30-meter no-grub zone on both sides of the crossing, for ease of location when it needs to be removed.

Harvest the merchantable timber along the ribboned right-of-way, being careful to keep the width of the cut strip to a minimum (one strip wide).

Place all available brush on trail to help keep equipment from contacting the mineral soil.

- The selected structure for crossing must clear the width of the stream channel such that the flow of water in maintained. If the water level rises to the extent the pads could potentially obstruct water flow, the structures are to be removed immediately.
- Stream bank stabilization needs to be maintained (i.e., no rutting or disturbance).
- No gravel, woody debris, or other materials should be placed in the high water mark of the crossing and the crossing is to be continually monitored to avoid sedimentation. Equipment tracks are to be cleaned before crossing the stream.

Removal:

After the temporary crossing is no longer required, it must be removed. Start on the inside portion of the crossing, approximately 30 meters from the stream, rehabilitate the forwarder trail by leveling up any ruts and spreading brush over the disturbed ground. This serves to stabilize the soil and prevent erosion. When you reach the crossing, cross to the outside, then remove the crossing structure taking care not to disturb the streambed. Continue to rehabilitate and brush-in the outside portion of the forwarder trail.

Cover the area on both sides of the crossing with brush to help stabilization and assist seeding. If there is insufficient brush to stabilize the approaches, an organic mat, seed, or hay may be used.

This Standard Operating Procedure covers the Significant Environmental Aspects relating to: maintenance of visual quality, fibre recovery, potential for degradation of water quality, and potential for soil disturbance.

HARVESTING ADJACENT TO SENSITIVE AREAS

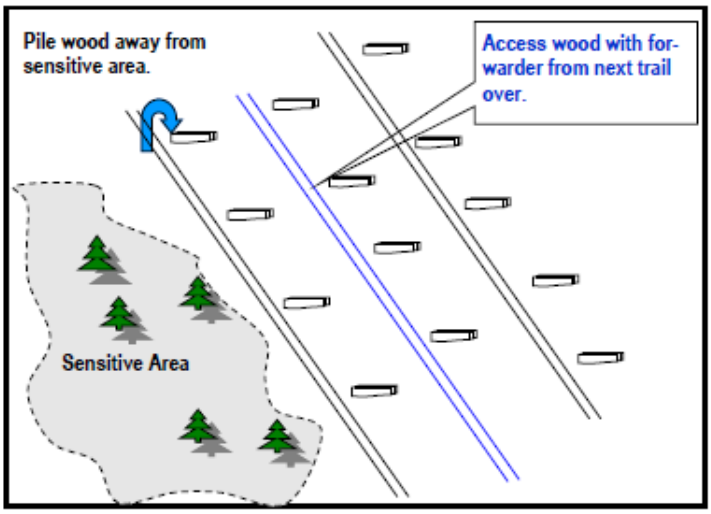
Rationale: To protect the soil integrity and water quality of sensitive areas during harvesting operations.

Background: On most harvesting operations there are sensitive areas that require special considerations because of their characteristics. These sensitive areas are most often at the bottom of a slope, and might be grassland, a bog, an intermittent stream, or soils of low weight-bearing capacity. Operators must follow specific procedures in order to prevent or minimize environmental damage to these areas.

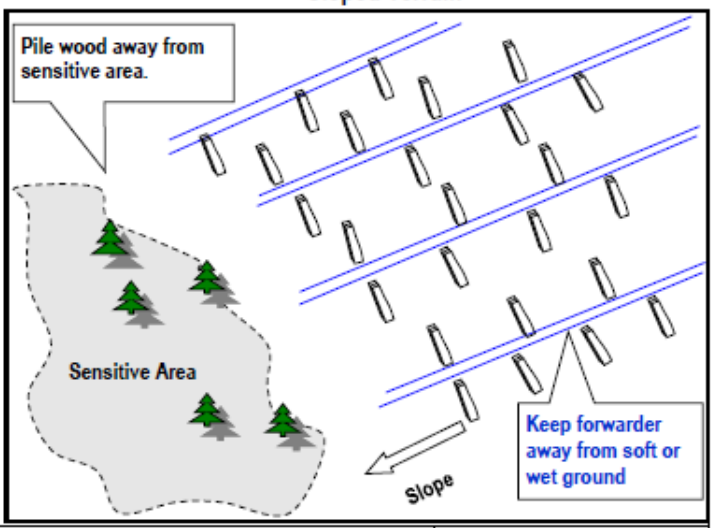
Procedures:

There are specific procedures for harvester and buncher operators when working next to a sensitive area. These procedures are to prevent soil erosion, mitigate impacts of soil compaction, and to protect water quality. Proper harvesting will support forwarding operations (Refer to SOP H-04 for Forwarder). Harvesters and bunchers must stay out of sensitive sites and reach into these areas to harvest wood. After felling a tree, the harvester or buncher should swing it away from the sensitive area for processing. The harvester or processor will pile the processed wood in a location for the forwarder to pick up from firmer ground. This ensures that the wood is well away from any soft, low weight-bearing or sensitive sites. This mitigates impacts on soil compaction and water run off areas. The forwarder to back up the slope, if possible, to return to the landing.

Flat Terrain



Sloped Terrain



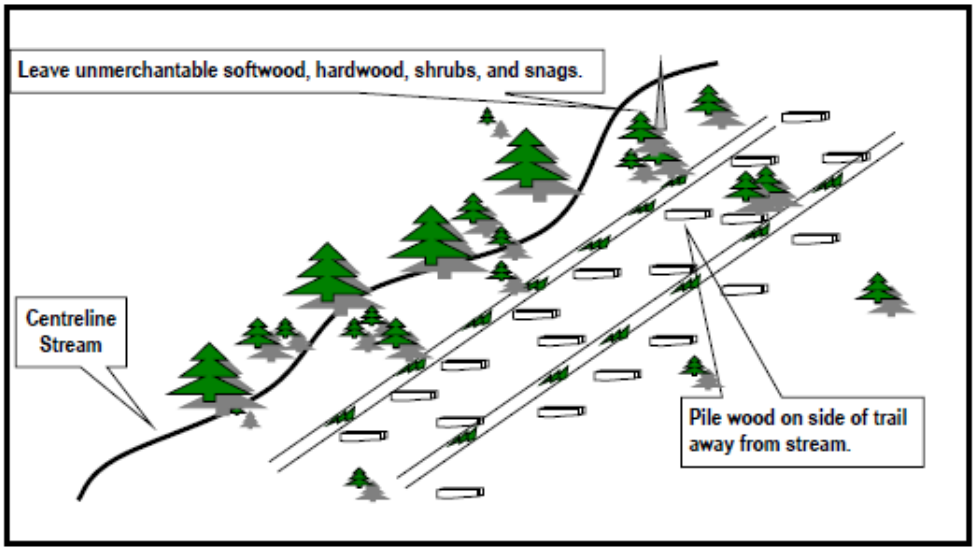
Centreline Streams

Centreline streams are one type of sensitive areas that require considerations in addition to those outlined above. Centreline streams are less than 2m in width, do not appear on a 1:50 000 NTS map. These streams are identified by centre-lining the stream with plain pink flagging tape. Harvesting may occur right up to the edge of centerline streams, but equipment must not cross the stream at will. If a crossing is necessary, a proper temporary crossing should be installed as in the SOP H-01 *Cutting Extraction Trails Through Buffers and Installing Temporary Forwarder Crossings*.

While harvesting and forwarding wood, efforts must be taken to protect the stream banks and water quality of these small streams. The following procedures have been developed for harvester and buncher operators working adjacent to centreline streams.

Maintain a minimum 5 meter machine-track free zone along the stream. Within this zone, to the fullest extent practical, leave non-merchantable trees, shrubs, and large diameter wildlife trees or "snags", preferably in patches.

When harvesting next to a centreline stream, pile the wood on the opposite side of the trail, as far away from the stream as possible. You should fall the trees towards the stream, and then haul them back for processing. Ensure tops and limbs are used for a brush mat under the harvester or buncher so that sediment will not be introduced into the stream, soil compaction will be limited, and natural regeneration seedlings are protected.



This Standard Operating Procedure covers the Significant Environmental Aspects relating to: maintenance of visual quality, potential for degradation of water quality, and potential for soil disturbance.

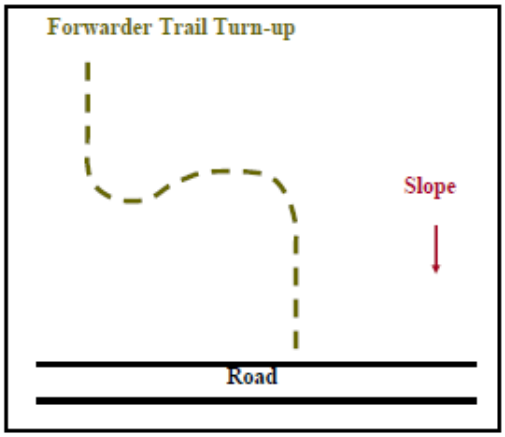
CONTROLLING EROSION AND REHABILITATING EXTRACTION TRAILS

Rationale: To prevent the erosion of extraction trails during and following harvesting operations which could otherwise degrade the site and/or cause sedimentation of waterbodies.

Background: During extreme rainfall events, sediment originating from active and inactive extraction trails may enter waterbodies, creating environmental incidents. To avoid this scenario, operators and supervisors must implement erosion control measures on extraction trails, both during their use and immediately after they become inactive.

Procedures:

While extraction trails are in use, monitor their condition continuously. Sometimes, despite practicing all the measures to prevent soil erosion, (*H-04 Minimizing Erosion in Harvesting and Forwarding Operations*), water can run down extraction trails as a result of a heavy rainfall. With continuous monitoring, there is an opportunity to control the water at the source of the problem rather than after it has reached the ditch.
As soon as water starts to run, contact the Supervisor immediately. More material may need to be added to the brush mat, or water may need to be diverted across the cutover. If so, place birch across the trails, establish water bars or diversion ditches, or utilize turn-ups, berms and natural dips to allow water to filter out over the cutover.



If it becomes impossible to control the flow of water on an active extraction trial, cease operations on that trail immediately and concentrate on controlling the water. This may include the use of hay bales and filter fabric that are required on all harvesting and roads operations.
Either of these erosion control structures may be used alone, or they may be used in combination, and they can be used at the source or where the water flows in to the ditch.

If all attempts to prevent sedimentation of a waterbody fail, the incident must be reported to the Operations Superintendent. A written report should be sent to the Environmental Management Representative within 24 hours of the incident.

Decommission Trails

Current legislation states that as soon as trails that may have potential for erosion are no longer required, they must be cut off or decommissioned. This should prevent the potential for erosion in the future during heavy rainfall or spring runoff. Excavators, wood loaders or forwarders can be used to decommission trails. Install water bars or diversion ditches at appropriate intervals, depending on slope, to dissipate surface water over the cutover. Ruts on slopes may also need to be smoothed out or filled in to prevent channeling of water down the trail.

Prevent this...

...by decommissioning.

Rehabilitate Trails

Rehabilitate trails that were excavated by placing the excavated soil back into the trench. This must be done without disturbing the cutover and existing regeneration. In addition to decommissioning trails to prevent erosion, efforts should be made to rehabilitate slopes within view of a road with high public use, for aesthetic purposes. Ruts should be filled with soil and/or brush in order to stabilize the site. For quick jobs, forwarder operators should rehabilitate problem areas as they go along, rather than have an excavator travel in to do it.

MINIMIZING SOIL EROSION IN HARVESTING AND FORWARDING OPERATIONS

Rationale: To prevent the erosion of soil from extraction trails during harvesting operations, which could otherwise degrade the site and/or cause sedimentation of waterbodies.

Background: Heavy rainfall during forwarding operations may cause sediment from active and inactive extraction trails to enter waterbodies, creating environmental incidents. Supervisors can plan and schedule operations to minimize the possibility of sedimentation events, and operators and supervisors can implement erosion control measures on active extraction trails.

Procedures:

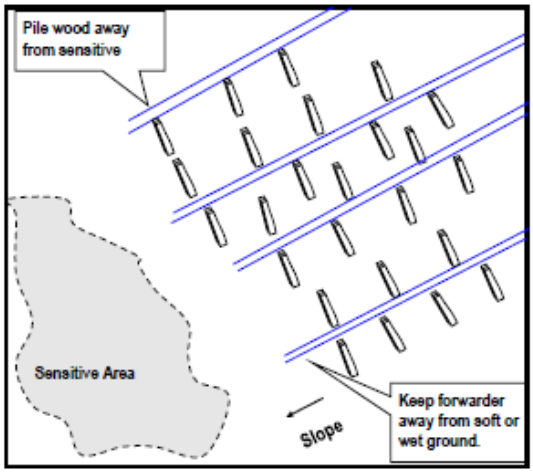
Be Prepared

The first step in preventing or minimizing soil erosion during operations is ensuring you have the appropriate materials, equipment and knowledge to deal with it:

- All harvesting operations are required to have on site 18.5 m^2 (200 ft^2) of filter fabric and 10 bales of hay, to assist them to react to running water that may result in the sedimentation of waterbodies. Store the hay inside a building or off the ground under a waterproof cover.
- If possible, have an excavator on site for emergency situations.
- Train forwarder operators how to control sediment by using appropriate forwarding techniques.

Plan for Forwarding

Locate extraction trails taking into account the slope, natural cross drainage provided by side hills, and the ability to create diversions to disperse surface water. Place the trails on the highest and driest ground possible, especially at roadside, and minimize their number and distance. Avoid forwarding, skidding, scarifying, or constructing extraction trails straight downhill for distances greater than 150 meters, to avoid the buildup of surface water velocity. Utilize turn-ups to stop the potential flow of water. When necessary, non merchantable timber (preferably) will be placed on the ground across the trails so that water traveling along them will be deflected away from the trail and out on to the surrounding vegetation.



Harvester operators have a role in forwarding as well. Because the forwarder follows the harvester, carefully select where you enter the block. Regardless of the conditions, always lay down brush mats. When harvesting near wet areas, pile wood away from wetlands towards drier ground, and inform supervisors and forwarder operators of these wet areas.
Forwarder operators also need to notify forwarder operators on the next shift about any potential or existing problem areas.
The number and distance of extraction trails are to be kept to a minimum.

Use Appropriate Forwarding Techniques

Match forwarding techniques to the conditions. For example, reduce load size in soft areas and top up the load with wood from a more stable part of trail, left purposely for that reason. Avoid sharp turns on wet areas. If a trail becomes rutted, stay on that one trail if possible, to avoid creating a number of extensively damaged trails.

Even when operating in optimum conditions, i.e., in a dry area on a dry day, anticipate where you might have problems. Take advantage of a low-lying area to build a push lane or a (birch) diversion. Always prepare for the worst case scenario.

Assigning operators to their own blocks, when possible, allows them know their area and take responsibility for it.

If a trail must be excavated to allow forwarders access, run the excavated trail across the hill, and build cut-offs every so often, to allow water to flow over cutover. Be careful to place the excavated material so that it can be put back easily, once the trail is no longer needed and is ready for rehabilitation. Never cross wetlands without proper approval from the Newfoundland Forest Services.

Scheduling

Be proactive in areas that have the potential for erosion. Cut sensitive and wetter areas during drier summer periods or in winter. Harvest difficult and unfamiliar areas during daylight, leaving easier areas for night time. If it rains when operating on poorly drained sites, move operations to better drained areas, if possible. Since soil moisture increases rapidly after the trees have been cut from the stump, schedule to forward the wood within 2-3 days of harvest.

Forwarding during a wet fall ...

At the Landing

When unloading at roadside, stay on the cutover whenever possible, and avoid crossing the ditch. If you must cross the ditch, use ditch blocks wide enough for a forwarder, if they are present. Otherwise, select a dry location where there are no cross-drain culverts and install a culvert, heavy steel pipe or temporary crossing, to minimize sediment entering the ditch.

ROADSIDE STORAGE, LOADING AND TRANSPORTING WOOD

Rationale: To maximize fibre recovery from roadside storage areas, minimize fibre losses during loading and transportation, and protect water quality in nearby waterbodies.

Background: There is the potential for a loss of fibre from the transfer of wood from roadside piles to wood trucks. This standard operating procedure is intended to provide documented guidelines for woodlands staff, contractors, and employees, to help minimize these losses, and at the same time ensure water quality is not compromised.

Procedures:

Roadside Storage - Forwarder Operators

- If possible, unload from the cutover to avoid crossing the ditch. This will minimize sedimentation from the ditch and the road.
- Place all pulpwood in roadside storage areas in neat compact piles, avoiding loose or stray pieces.
- Locate piles on level ground to avoid pile tipping; use sill logs if required.
- Straddle ditches for wood storage; wood must not block off flow in a ditch or culvert.
- Ensure sawlogs are not contaminated by mud and soil; if necessary, place them on sill logs of unmerchantable trees, and far enough from the road to avoid being splashed with mud.
- When offloading the forwarder, remove debris that was picked up during the loading process. Debris may include, limbs, tops, moss, roots, stumps, broken pieces, or rocks. Debris is a hazard during tuck loading and transportation.

- Avoid areas with high water tables (ponded water) for storage of wood, especially if the wood is to be stored in the fall and recovered during the winter.
- Minimize the number of landings to be constructed. Locate landings on well-drained areas and maximize piling on these areas.
- If piling next to a wet area or centerline brook, ensure that no woody debris enters the stream.
- **Do not** store wood within 30m of a watercourse.

Loading Wood

Loader/Forwarder Operators, Truck Drivers

- Load wood on trucks as evenly as possible, and crown load to allow for effective binding.
- Recover all wood dropped by the loader and place on the load.
- Ensure all pieces from roadside piles are picked up and loaded.
- Take care to minimize damage during loading, especially when loading frozen inventory wood near the ground.
- Place wood on trucks in a manner that conforms to the legal requirements for each truck/trailer configuration, including total allowable weights and the restrictions or limitations set for each axle.
- When loading the front and rear bunks of a shotgun trailer, Place the wood in position so it's elevated at the end of the trailer. This can be achieved by focusing on placing butts out. By doing this, if pieces of wood were to move, then it will move inwards on the trailer, and not shift off the trailer.

- Whenever possible, avoid driving the loader on a pile of wood. This breaks up smaller pieces, which increases wood wastage and makes transportation more dangerous.
- Avoid driving a loader on a pile of sawlogs.
- Watch for rocks, and remove any that are found.
- When picking up the bottom of a roadside pile, "shake" the grapple to release debris. When debris is seen, remove it before placing the wood on the trailers.
- When loading the bottom of a roadside pile, avoid placing it on the bottom of the trailer, and also avoid placing it on the top of the trailer.
- When picking up the bottom of a roadside pile, do not allow the grapple to penetrate the ground below, as this could result in picking up soil and rocks.
- During loading a trucker may ask the loader operator to adjust the load by adding or removing wood, by moving wood from one bunk to another, remove debris or place wood between the trailer stakes.

Transporting Wood - Truck Drivers

- Trucks are **NOT** to place load securing straps/cables while the trailer(s) are being loaded. Load securing straps/cables are to be put in place after the truck moves away from the loader.
- When trucks pull away from the wood loader, the trucker accepts responsibility for the transportation of the load.
- The wood loader operator **must** stop the loading process when a truck driver is checking gauges on the trailer.
- Wood loader operator will not resume loading until the truck driver is either in the cab of the truck or standing away from area.
- Secure the load in close proximity to the wood loader. Do not travel the forest access road with an unsecured load.
- Before walking to the trailer or wood loader make eye or radio contact with the wood loader. The wood loader operator will lower the grapple to allow the trucker to approach.
- The wood loader operator must stop the loading process if a truck driver attempts to place load securing apparatus. The wood loader operator will not resume loading until the truck driver is either in the cab of the truck or standing away in front of the truck.
- Use yellow ramps provided on the jobsite or at Government weigh scales to inspect loads and remove wood if necessary. Use load aligners, trim ramps and yellow ramp to inspect and trim up each load prior to entering any public highway.
- If for some isolated circumstance wood must be removed from the trailer other than at the yellow ramps, you may throw off wood only with your Supervisor's approval, at an agreed upon location. This wood must be picked up on the return trip and brought to the jobsite.
- Where ramps are not provided, a machine must remove the wood (truck drivers are not permitted on top of loads).
- All wood will be recovered by a forwarder or loader on the jobsite, or a third party contractor at the weigh scales.

Yellow Ramp

PREVENTING SOIL DAMAGE & SLASH MANAGEMENT DURING SKIDDING OPERATIONS

Rationale: To protect the soil integrity and water quality of sensitive areas during harvesting operations.

Background: If not properly executed, skidding operations present a risk of damage to forest soils, which can impact water quality and future tree growth. Such damage may include compaction, rutting, erosion and nutrient loss.

Procedures:

Avoid funneling of traffic unless soil strength is high. Minimize turning in the cut block and at landings.

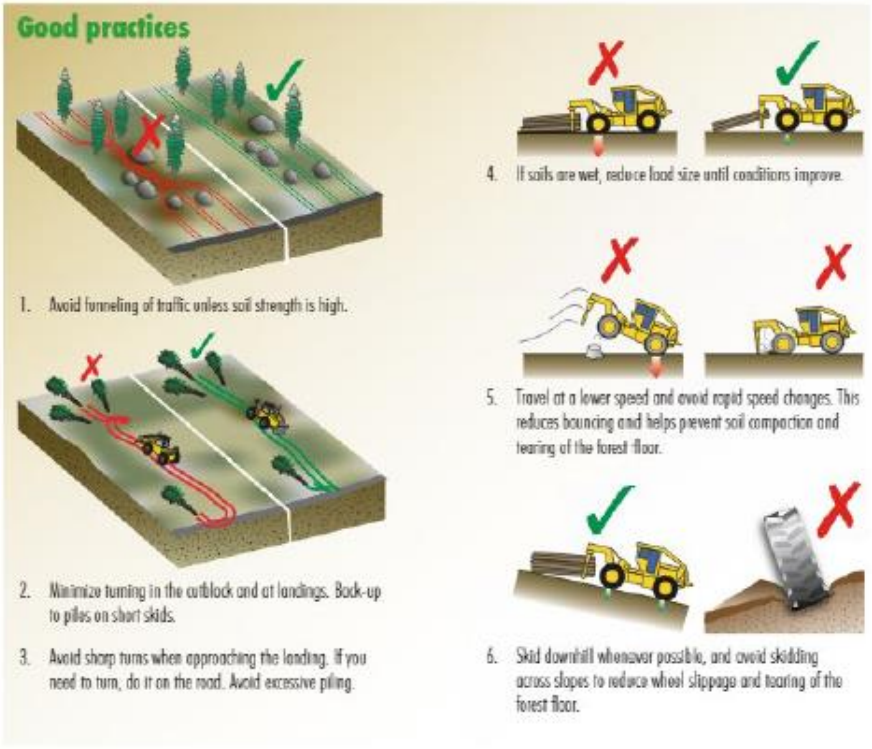
-Back-up to piles on short skids.

-Avoid sharp turns when approaching the landing. Avoid excessive piling.

-If soils are wet, reduce load size until conditions improve.

-Travel at a lower speed and avoid rapid speed changes. This reduces bouncing and helps prevent soil compaction and tearing of the forest floor.

-Skid downhill whenever possible, and avoid skidding across slopes to reduce wheel slippage and tearing of the forest floor.



Promote frost penetration on sensitive areas and high traffic areas such as landing near roadsides by packing or blading the snow in advance. Allow sufficient time (typically, at least overnight) for frost to penetration.

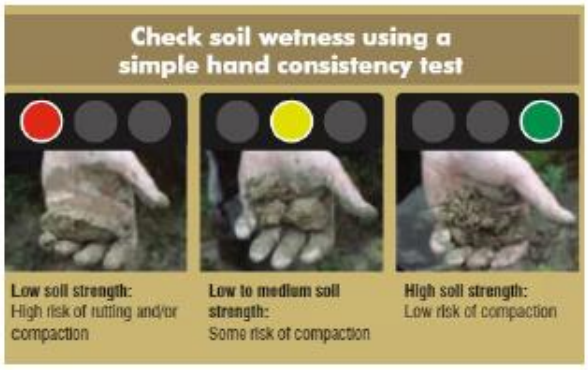
Is the ground frozen? Check the depth of frost penetration required for protection from machine traffic.

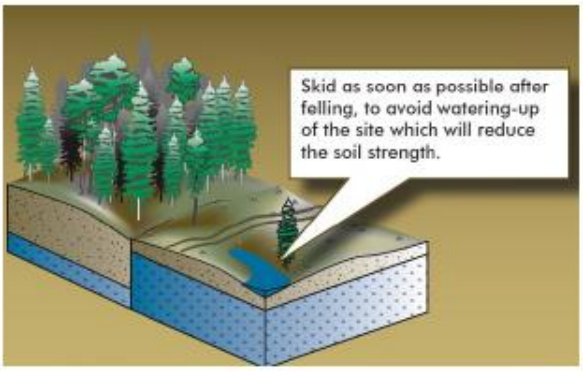
Depth of frost required for protection		
Soil type	Compaction	Rutting
Mineral	> 15 cm	7 – 15 cm
Organic		50 cm if wet 70 cm if dry

Reuse trails! Use existing feller-buncher trails where the insulating snow layer is packed and frost penetration is deeper.

Operating when soil strength is reduced:

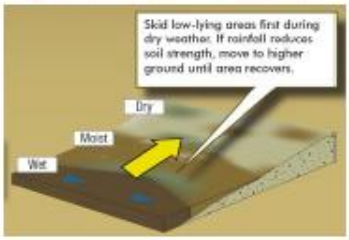
Rut depth is influenced by soil strength and the number of passes over the same trail. Soil compaction may occur after only four or five machine passed, or less if the soil moisture is near saturation. On fine-textured saturated soils, ruts can be formed in only one pass.

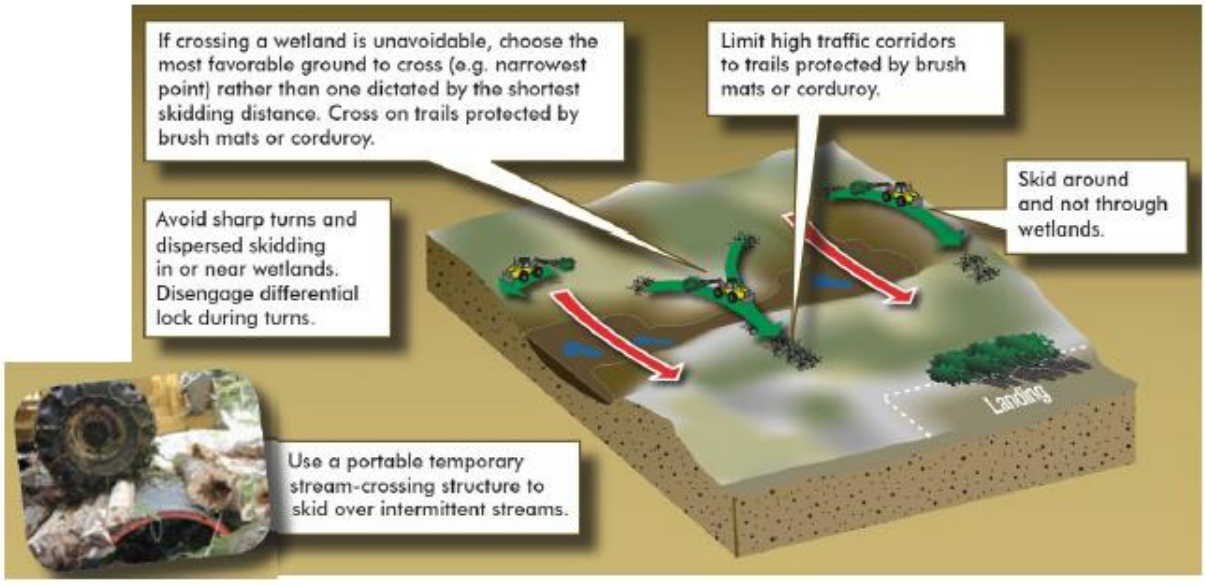




Working Around Wetlands

Swales, drainage ways, seepages and organic pockets are often saturated year round and may not freeze sufficiently in the winter. Soil strength is usually low and machine travel can easily result in rutting and disruptions to natural drainage systems.





Slash Management for Soil Protection and Ecosystem Integrity

1. Use of Brush Mat for soil Protection

- ◊ During harvesting, full-tree skidding is utilized to transport trees to roadside processing areas. To mitigate soil compaction and rutting, branches and tops (slash) are intentionally distributed along skid trails to form a brush mat.
- ◊ This brush mat helps disperse equipment weight, reduce soil disturbance, and protect organic soil layers, ensuring the long-term productivity of the site.
- ◊ The effectiveness of the brush mat is monitored, and additional slash is added as needed in areas with high traffic or sensitive soils.

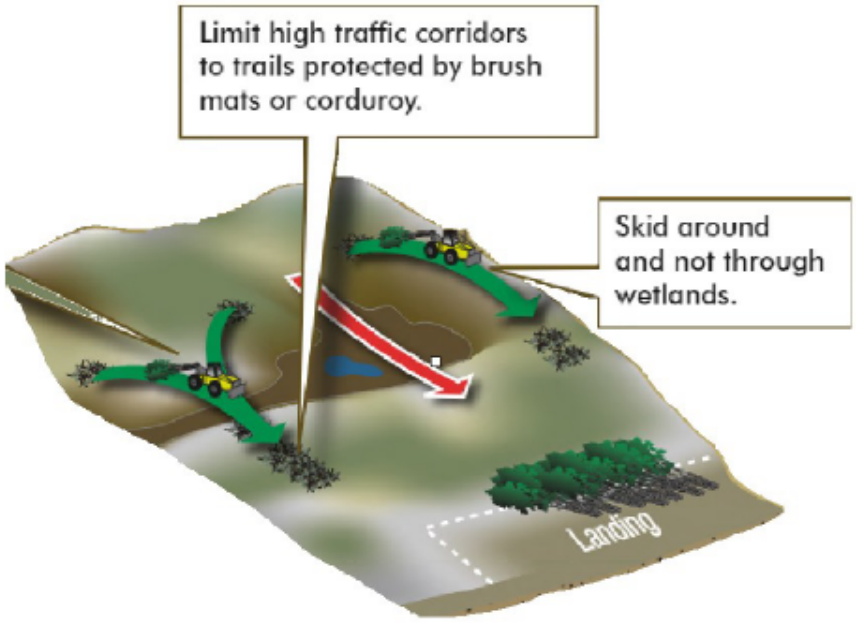
2. Redistribution of Slash on the Cutover

- ◊ Once processing is complete at roadside, slash is systematically redistributed back onto the harvested area to aid in nutrient cycling, soil moisture retention, and erosion control.
- ◊ This practice ensures that organic material is evenly dispersed rather than concentrated, supporting natural regeneration and soil fertility.
- ◊ Special attention is given to leaving coarse woody debris in areas where it can benefit biodiversity, including providing habitat for fungi, insects, and small wildlife species.

3. Erosion Control and Water Quality Protection

- ◊ Slash is positioned away from watercourses and not allowed to accumulate in ways that could obstruct natural drainage or contribute to sedimentation.
- ◊ On slopes and exposed areas, slash is used as a natural erosion barrier, stabilizing soil and reducing surface runoff.

By implementing these slash management practices, we minimize environmental impact, protect soil integrity, and support the regeneration of healthy forest ecosystems.



This Standard Operating Procedure covers the Significant Environmental Aspects relating to: potential for degradation of water quality, and potential for soil disturbance.

DETERMINING BUFFER REQUIREMENTS FOR UNMAPPED STREAMS

Rationale: To ensure the proper and consistent buffering of streams that do not appear on a 1:50 000 scale NTS map (unmapped streams).

***Background*:** In areas scheduled for harvest, unmapped streams need to be assessed for buffering. Permanent streams have water flowing in them all year long in a defined channel, while ephemeral streams have water flowing in them only on an intermittent basis (usually in the spring and fall). Channels must be flagged prior to harvesting so that equipment operators do not accidentally cross them with their machinery (refer to H-02 Harvesting Adjacent to Sensitive Areas *Centreline Streams*).

Procedures for Assessing Unmapped Streams:

At some time prior to harvesting, planning technicians or other supervisory personnel will conduct a field reconnaissance of all operating areas. During that reconnaissance, all streams encountered will be evaluated to determine whether they require a buffer or are considered a centerline brook.

A 30 metre, no harvesting activity buffer zone shall be established around all water bodies that are identified on the latest 1:50,000 national topographic system (NTS) maps.

Streams greater than two metres in width that do not appear on the NTS maps require a 30 metre buffer and can be identified using the below criteria:

- The stream must have defined bottom;
- Banks that exceed 30 centimeters in depth;
- Meets or exceeds an average 2 metres in width measured at 40 metre intervals over a 200 metre distance along the stream.

The width is measured at right angles to the general orientation of the channel. Vegetated islands within the stream are not included in the channel width. Where one or more islands separate multiple channels, the total width is the sum of all separate channel widths. Islands not vegetated, however, are included in the stream width.

Lake & Watercourse Buffer Zone flagging tape is used for flagging stream buffers and plain pink for centre line brooks (reference SOP PL -02).

Streams with a defined channel width of less than 2 metres are classified as centerline brooks and must have the centerline flagged with plain pink flagging tape. When streams are encountered that include sections containing widths both less than and greater than 2 metre, the break point must be closed off in the field with pink Lake and Watercourse Buffer Zone flagging tape.

To measure the width, select a point along the stream inside the block boundary; mark the starting point with a blue ribbon, and record the GPS coordinates. From this location take 5 measurements of the channel width 40 m apart. Record all channel measurements for the file. If 3 out of the 5 measurements are less than 2m (the buffering threshold), centreline the brook with plain pink flagging tape. Move downstream 200m, marking the centerline as you go, and take another set of 5 measurements 40m apart. Continue moving downstream and centre-lining, taking 5 measurements at 200m intervals, until 3 out of the 5 measurements are greater than 2m. This will be the break between the buffer and no buffer sections. Record the GPS coordinates of this break point, then flag a line perpendicular to the brook for 30m on either side of the brook, using pink Lake & Watercourse Buffer Zone flagging tape.

If at the starting point, 3 out of the 5 measurements are greater then 2m, move upstream to determine the break point between the buffer and no buffer sections. Continue moving upstream at 200m intervals until 3 out of the 5 measurements are less than 2m. Mark the break point as above and record the GPS coordinates.

If streams beds are found but there is no water flowing in them, they will be categorized as ephemeral streams and evaluated to determine buffering requirements. GPS coordinates will be recorded for the location of an ephemeral stream and pictures will be taken verifying that the stream bed was dry. This information will be kept in a block buffering file for future reference.

This Standard Operating Procedure covers the Significant Environmental Aspect relating to: potential for degradation of water quality and potential for soil disturbance.

INSTALLATION AND REMOVAL OF TEMPORARY STREAM CROSSINGS FOR WINTER ROADS

Procedures:

District Planners complete road layout and collect the stream location, width, & depth. Before pictures are taken. The crossing is assigned a unique number in the office. Maps are prepared and information is organized. SFM Forester prepares **LoA** (Letter of Advice) application complete with all data mentioned above. Multiple LoA applications will be sent in the calendar year. Request for Blanket Permit is sent to the Department of Environment -Water Resources.

The location of the temporary stream crossing is marked by tying orange truck road ribbons on trees at the crossing location. Ribbons should be high enough to be seen over the snow banks.

Contractor Data Collection Responsibility:

- Inform Roads Superintendent a minimum of **3 days notice** of installation of temporary winter road or all-season road culvert installs.
- Installs crossing in approved locations only.
- In the case of **Temporary Winter Road Crossings:** Installed, and removal pictures required. This includes the stream banks and stream bed. In the case of **Permanent Culvert Installations** both upstream and downstream photos are required (culvert ends with rip-rap). Identify all photos with the assigned crossing number found on the provided maps. Survey123 can be used to submit this data.
- Replacement of existing structures will require collection before and after, upstream and downstream photos as well. Survey123 can be used to submit this data.
- Send all photos to Roads Superintendent immediately after the project is completed. Survey123 can be used to submit this data.

(Procedures continued…)

- The selected structure for crossing must clear the width of the stream channel such that the flow of water in maintained. If the water level rises to the extent the pads could potentially obstruct water flow, the structures are to be removed immediately.
- Stream bank stabilization needs to be maintained (i.e., no rutting or disturbance).
- No gravel, woody debris, or other material should be placed in the high water mark of the crossing and the crossing is to be continually monitored to avoid sedimentation. Equipment tracks are to be cleaned before crossing the stream.

Removal:

Slope (%)	Water Bar Spacing (m)
0-2	75-120
3-5	40-60
6-10	24-30
11-15	18-24
16-25	12-14
26-30	10-12
>=30	9

Temporary crossings cannot be left installed with plans to be removed later in the year. Removal should be done prior to spring break-up. When the harvest block is complete they need to be removed. Re-entry into an area at a later date will require the installation of a new crossing, with a new approved LoA.

Start on the inside portion of the crossing, rehabilitate the road by leveling up any ruts and installing water bars. Establish water bars at the beginning and of the 30m no-grub zone to ensure no ditch water enters the stream. Steep road grades require water bars as well, at structured intervals, depending on slope. The adjacent table shows the interval distances that are recommended for effective control of road surface runoff. Spread brush over the disturbed ground, this serves to stabilize the soil and prevent erosion.

When you reach the crossing, cross to the outside, then remove the crossing structure taking care not to disturb the streambed. Continue to rehabilitate, install water bars, and brush-in the outside portion of the road.

Cover the area on both sides of the crossing with brush to help stabilization and assist seeding. If there is insufficient brush to stabilize the approaches, an organic mat, seed, or hay may be used.

Outside of the 30m no grub zone construct a berm to block access to snowmobiles and other vehicles until the winter road is no longer travelable.

CULVERT AND PIPE ARCH INSTALLATION

Rationale: To ensure proper installation of culverts and pipe arches associated with road construction, to prevent the sedimentation of streams.

Background: Road building activities, including culvert installations, have the capacity to cause environmental damage around waterbodies. The proper installation of culverts and pipe arches promotes sound environmental construction principles and ensures a long service life of the structure. During sub-grade construction, road drainage culverts should be installed as work progresses to limit water movement.

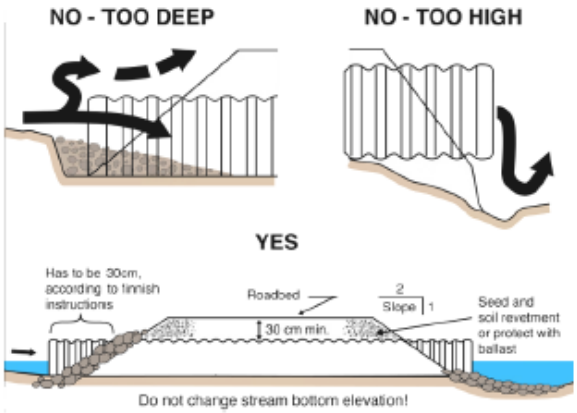
Water Course Crossings structures should be designed based upon the following criteria:

⇒ Structures have to be designed to handle the associated flows for the stream in question.

⇒ Structures have to be designed based upon site characteristics and to ensure fish migration is maintained.

⇒ Structures have to be designed to prevent erosion and sedimentation that adversely affect water quality

Procedure: The following procedure has been used here and throughout North America to effectively provide access to timber harvesting operations, while protecting the aquatic environment. In addition to following this procedure, contractors must be in possession of and adhere to a Department of Environment and Conservation "Permit to Alter a Body of Water", and if required, Fisheries Act authorizations and any attached Mitigation Measures. District Planners complete road layout using orange truck road ribbons. During this, stream locations, stream widths, stream high water depths and stream bottom sub grades are recorded. Up stream, down stream and stream bed pictures are also captured. Each crossing is assigned a number at the office, which will be illustrated on the maps prepared, including all the information gathered for a particular project. A **LoA** (Letter of Advice) application is completed with all data mentioned above and sent to DFO for approval. Once approval is received, the installation of permeant stream crossings can commence. Inform Roads Superintendent a minimum of **3 days notice** of installation of permanent crossings in approved locations only.



Position the structure to follow the natural alignment of the stream. If the stream is natural fish habitat, embed the structure a minimum of 150mm below the natural streambed, up a maximum of 1/3 of the culvert diameter, for the entire length of the structure (i.e., inlet and outlet). This will facilitate the passage of fish and the creation of pools. If the subgrade does not allow for the culvert to be sunk, construction of a plunge pool will be required at the outlet of a culvert installation. A plunge pool is created by forming a small pool at the outlet of the culvert, which backs water up into the pipe for fish migration.

Important Notes:

⇒ Multiple culvert installations require the bottom of the main culvert to be set into the streambed. A minimum gap of 1 meter between culverts is required to allow adequate compaction of material.

⇒ Culverts and pipe structures should be placed on stable foundations. Never install culverts on sod, frozen earth, on beds containing large rock, or an uneven trench bottom.

⇒ Construction should be suspended during periods of intensive rainfall or when soils are saturated because of the threat of erosion or sedimentation.

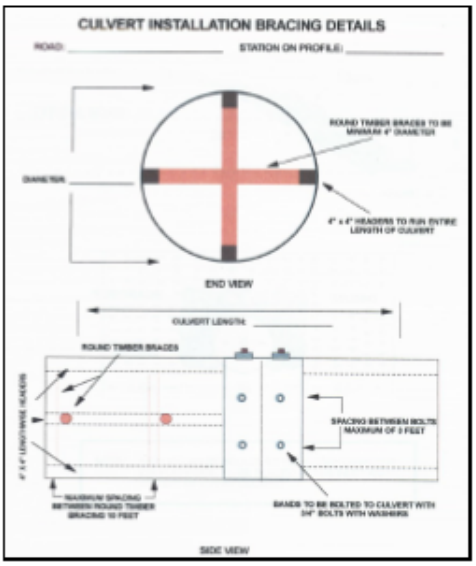
⇒ Permanent stream crossing structures should be installed as soon as possible, preferably during subgrade construction.

⇒ Joiners are put into position at the end of one section of CSP with the joiner open to receive the next section. The second section is brought against or to within about 2.5 centimeters of the first section. After checking to see that connecting parts of both joiner and CSP sections match, and that the interior of joiners and exterior of CSP are free of dirt, stones, etc., bolts are inserted and tightened. On large diameter CSP, merely tightening bolts may not assure a tight joint, due to the friction between the joiner and the CSP. In such installations, tap the joiner with a mallet to take up the slack as the band is tightened. For CSP culverts 1600 millimeters and greater, the joiners must be bolted to the culvert.

⇒ The load carrying capacity of culverts or pipe arches depend on proper backfilling. To obtain maximum strength and prevent washouts and settling, it id necessary that the backfill be made of good material, properly placed and carefully compacted. This is extra important with large diameter culverts. Backfill should be placed under the haunches of the culvert and tamped, using light tamping equipment or 2x4 poles to achieve suitable compaction and to eliminate the possibility of voids under the culvert. Place backfill equally on both sides of the culvert or pipe arch in layers 15-20 centimeters thick, thoroughly tamping each layer. Compacted layers must extend for at least one diameter on each side of the structure, to a depth above the culvert equal to one half the culvert diameter, but not less than 45 centimeters. Care must be taken to prevent water leaking through the fill along the culvert. When granular materials have been added for bedding, the ends of the fill should be sealed against infiltration to avoid undermining the culvert.

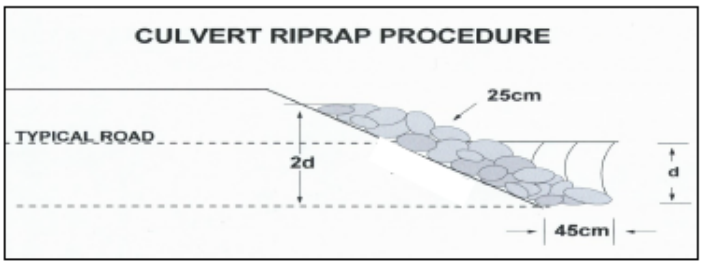
Structures greater than 1500mm require bracing before being backfilled. Structures with diameters in excess of 1600mm require joiner bands to be drilled and bolted.

Prior to backfilling, install non-woven, geosynthetic fabric around culverts in permanent water bodies, to prevent fines from entering the stream. The fabric must be a minimum of 5.5m wide, extending to the width and height of the required riprap (or to the road surface if the height of the riprap will be less than the diameter of the structure). Cut two pieces of geosynthetic fabric to the desired length. Make a hole the size of the culvert diameter in each piece and fit them over the openings of the structure. Backfill from the center of the structure to either end, in successive layers, until the required height of fill is reached.



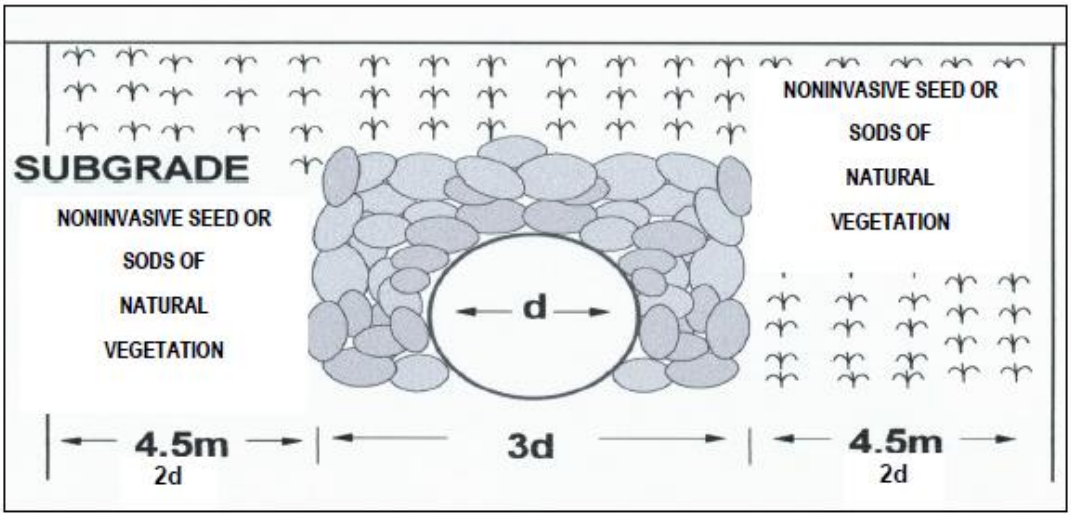
Backfill material must come from a borrow pit outside the established 30m no-grub, no less than 60m from the stream. It can be excavated and pushed to the structure with a tractor, or carried with an excavator. Excavation in the no-grub zone is allowed only if authorized by a CBPPL staff member. Cross-culverts may be required to prevent run-off from entering the stream. If so, they must be properly designed and installed outside the 30m no-grub zone, in a location determined by existing conditions.

Once the structure is backfilled, position the geosynthetic fabric along the top and sides of the structure. Stabilize with riprap comprised of angular rocks, ensuring there are no voids. The height of the riprap should equal the diameter of the structure, with the remaining embankment to the road surface stabilized with alternative methods. If the embankment from the culvert to the top of the road is less than the diameter of the structure, the riprap must extend to the road surface. The riprap must also extend beyond the width of the natural streambed or to a minimum of one culvert diameter on each side of the structure. Side casts are then sloped to prevent erosion of fill material into the stream. Refer to your contract for the appropriate ratio.



If suitable rip rap is not available on site, it can be transported to the culverts. Rock must be used for stabilization to at least the high water mark. The remaining embankment can be stabilized with a combination of geosynthetic fabric, corduroy, slash, tops, organic mat, and seed, deemed to be adequate by the CBPPL Roads Operations Superintendent or designate.

Stream crossings must be stabilized promptly after construction activities are finished to prevent erosion. For structures installed in permanent water bodies , noninvasive seed or natural vegetation (from outside the no-grub zone) should be placed on exposed mineral soil on each side of the structure for twice the diameter of the structure. The natural vegetation has to be placed in such a manner, and in sufficient quantities, to ensure that re-rooting and stabilization will occur. The Roads Operations Superintendent may waive the requirement for seeding if, in his/her opinion, the embankments are stable and will not erode or cause sedimentation to enter the stream. Apply hay to exposed mineral soil within the no-grub zone to capture sediment that would have negative impacts on water quality.



Crossings must be monitored during operations to ensure the structure is functioning properly and no negative environmental impacts are evident. If crossing construction activities or active operations create rutting or channeling on the crossing approaches, disperse the water flow to an undisturbed, stable filter area, using water bars, check dams, or similar structures. When operations are finished, it is important to remove any sediment or erosion control structures and/or materials such as silt fence, excessive geosynthetic fabric, etc.

Contractor Data Collection Responsibility after installation:

- Installed pictures required; this includes upstream and downstream of both the culvert ends with the installed rip rap. Re-name all photos with the corresponding crossing number found on the provided maps. Survey123 can be used to submit this data.
- Send all photos to Roads Superintendent immediately after the project is completed. Survey123 can be used to submit this data.

This Standard Operating Procedure covers the Significant Environmental Aspects relating to: potential for degradation of water quality, and potential for soil disturbance.

WINTER ROAD CONSTRUCTION

Rationale: To ensure the proper construction of winter roads, so as to prevent or minimize erosion and sedimentation during spring run-off.

Background: Winter roads are generally constructed for short service, their life span dependent on the temperature. As temperatures rise above freezing, the road surface disappears, making access impossible. Winter roads have lower standard requirements than all-season roads, and there are different techniques for their construction, depending primarily on weather conditions (snow pack, temperature, etc.).

Procedures

In preparation for the winter road, you must first cut the right-of-way. Since less building material is required for winter roads, cut the right-of-way to 18m (versus 30m for all-season roads), keeping the woody debris on the road surface. Flip the stumps so the roots face up, and compress the woody debris with machine tracks or the excavator bucket.

Using more woody debris, and snow and soil from the side of the road surface, construct the sub-grade. It is important, however, to minimize the amount of mineral soil used, in order to reduce sedimentation and erosion during the spring.

Once the building material is piled and leveled, back-drag the sub-grade with a dozer blade or compact it with machine tracks, to facilitate the penetration of frost and the creation of a solid base to support trucking operations. If the installation of any temporary crossings is necessary, follow the **SOP R-01** ***Installation and Removal of Temporary Stream Crossings for Winter Roads.***

Once operations are finished, remove all temporary stream crossings and stabilize the stream banks (see **SOP R-01**). Construct water bars on both sides of streams, to control water on the road surface and divert it to the cutover away from the streams. Water bars should also be excavated at any low points where water may pool. If necessary, build a ditch across the mouth of the road to prevent vehicle traffic and erect a sign to alert the public of the hazards ahead (see **SOP R-01**).

This Standard Operating Procedure covers the Significant Environmental Aspects relating to: potential for degradation of water quality, and potential for soil disturbance.

ROAD CONSTRUCTION METHODS - CUT AND FILL

Rationale: To ensure the proper construction of roads in areas of undulating topography.

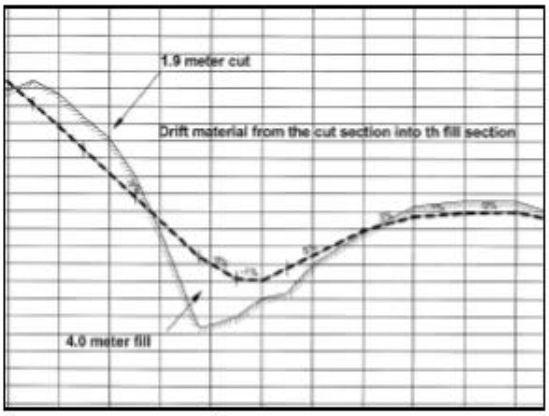
Background: Different techniques for constructing forest access roads on varying terrain were tested by selected contractors during the summer of 2005. The following cut and fill technique was found effective in terms of production and overall job quality for undulating topography.

Procedure:

The cut and fill method of road construction is used in areas of undulating (pit and mound) topography. It involves the movement of significant quantities of material from crested areas (cuts) to low lying areas (fills), in order to build a relatively level roadbed. Bulldozers are generally the machines of choice for this method because of their capacity to move greater amounts of material from cut areas to fill areas with less handling. Excavators have to stockpile and re-handle material, making them less productive and therefore less desirable.

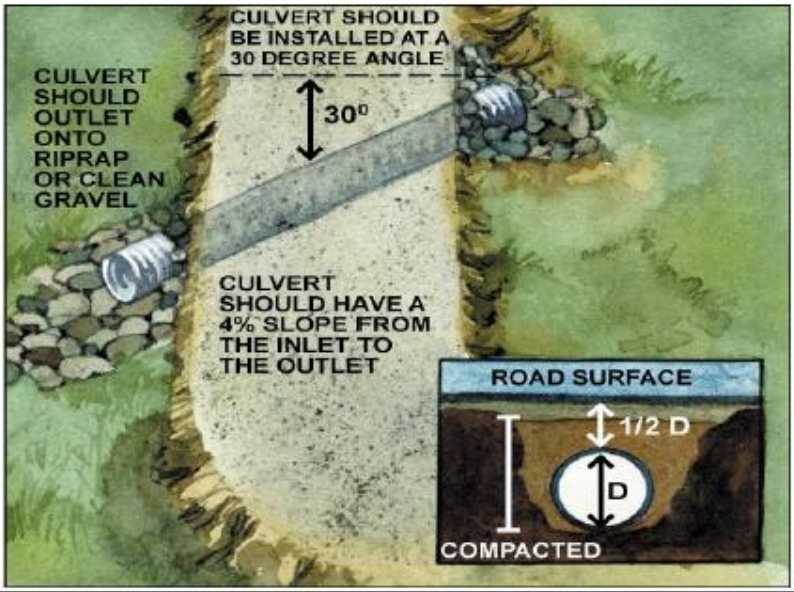
To start, strip the organic and woody debris (overburden) from the cut slope and transfer it to the fill area. Strip an area large enough to achieve the desired slope on the cut banks (refer to contract for appropriate ratio). Maintain a 30m no-grub zone on both sides of a watercourse.

Once the overburden is removed, make successive cuts to the crested area, moving material to the fill area at each cut. The depth of cut is shown on the road profile and design, which is completed prior to tendering and the commencement of work.
When the cut and fill is established according to the profile and design, crown the constructed sub-grade and taper the cut banks to the appropriate slope for the material present (refer to contract).



Create a ditch line along the toe of the cut bank to receive any road and/or surface water. Where possible, without compromising the integrity of the road, ditches should not empty into streams of any size. Ditch relief culverts (cross drains) and/or take-off (wing) ditches are required along the ditch line to disperse any water into vegetated areas. This will control the water flow and help reduce its velocity.

Determine the number of cross drains and/or take-off ditches required by the following simple rule: **1 cross drain (or if the terrain permits 1 take-off ditch) at 750m intervals for every percent slope.** For example, a road with a 2% grade would require a cross drain or take-off ditch every 375m. Install cross drains at a 30 degree angle to the road, and slope them to a 4% grade for sufficient flow and lower maintenance.



ROAD CONSTRUCTION METHODS - FAVOURABLE TERRAIN

Rationale: To ensure the proper construction of roads in areas of favourable ground conditions.

Background: Different techniques for constructing forest access roads on varying terrain were tested by selected contractors during the summer of 2005. The following is generally the most common method of road construction if ground conditions are favourable.

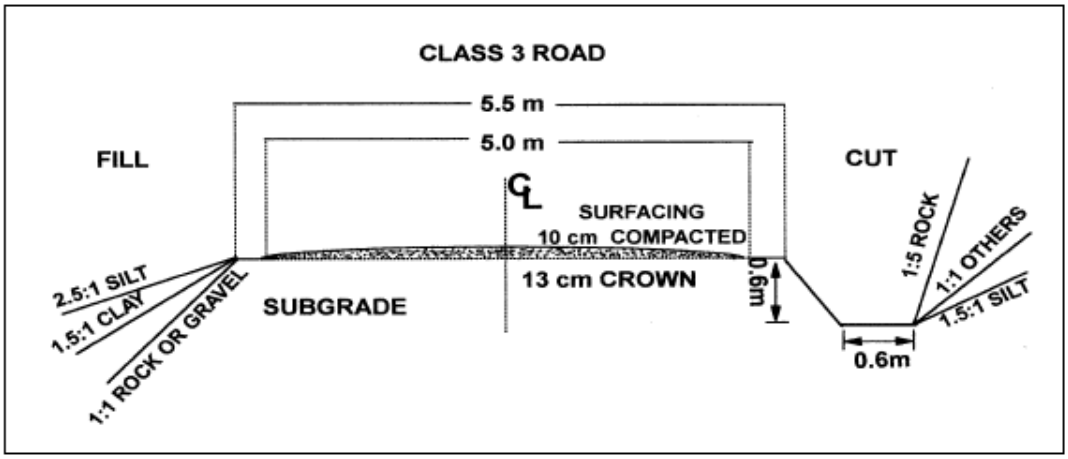
Procedure:

Clear or grub the area under the road sub-grade, constructing a brush mat to support the sub-grade. Windrow excess woody material (grubbings) to the high side of the right-of-way, where the top of the ditch will be.

Next, dig (trench) material from the high side to construct the road sub-grade on the low side. Maintain the designated no-grub zone on both sides of any permanent waterbody.

Windrow the trenched material in the location of the road centerline. It is crucial that the windrow follow the correct alignment within the right-of-way. Take care to ensure no organic material or excessively large rocks are added to the sub-grade.

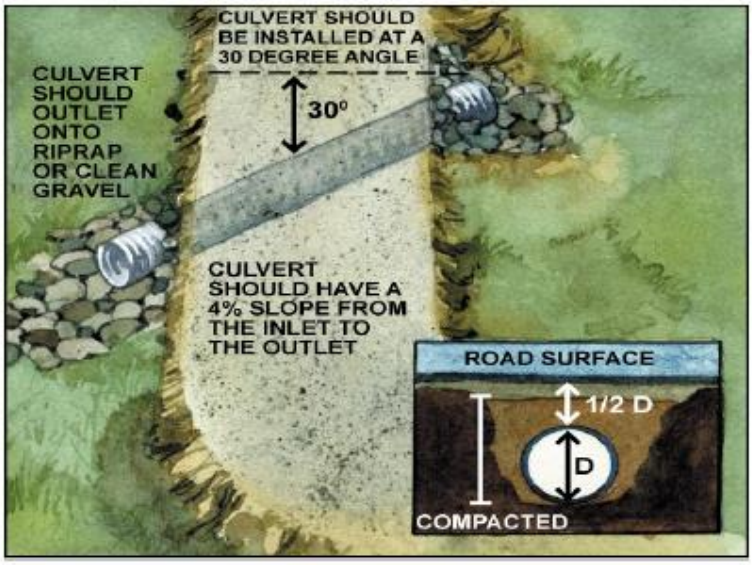
Level the windrow with a tractor or excavator bucket to the correct width and height specifications. Road widths, heights, ditch dimensions, etc., are illustrated here for a class 3 road. Class 4 operational roads have different specifications, and it's important that the operator be aware of these prior to construction. Class 4 specifications will be outlined during the pre-work meeting. Crown the road surface to promote good surface drainage into the ditches.



In the excavated trench, bury the woody debris and organic material that was stockpiled during the right-of-way preparation phase. Slope the trench to produce a ditch line that follows the same grade as the road. Ditches should not empty into streams of <u>any</u> size. The area of grubbing activity should be kept to a minimum when possible, to reduce the potential for sedimentation

Support the ditch line with ditch relief culverts (cross drains) and/or take-off ditches to control the volume and velocity of water in the ditch. All ditches should be built at the same gradient as the road. In side hill and similar areas, ditches should be installed on the uphill sides of roads to intercept seepage and run-off. Ditches should be constructed so that ditch wall side slopes (from the road shoulder to the bottom of the ditch and the ditch back wall) and ditch depths (both maximum and minimum) are as per specifications outlined in
SOP PL-06.

Determine the number of these structures required by following this simple rule: **1 cross drain (or if the terrain permits 1 take-off ditch) at 750m intervals for every percent slope.** For example, a road with a 2% grade would require a cross drain or take-off ditch every 375m. Install cross drains at a 30 degree angle to the road, and slope them to a 4% grade, for efficient flow and lower maintenance.



ROAD CONSTRUCTION METHODS - BUILDING OVER WET TERRAIN

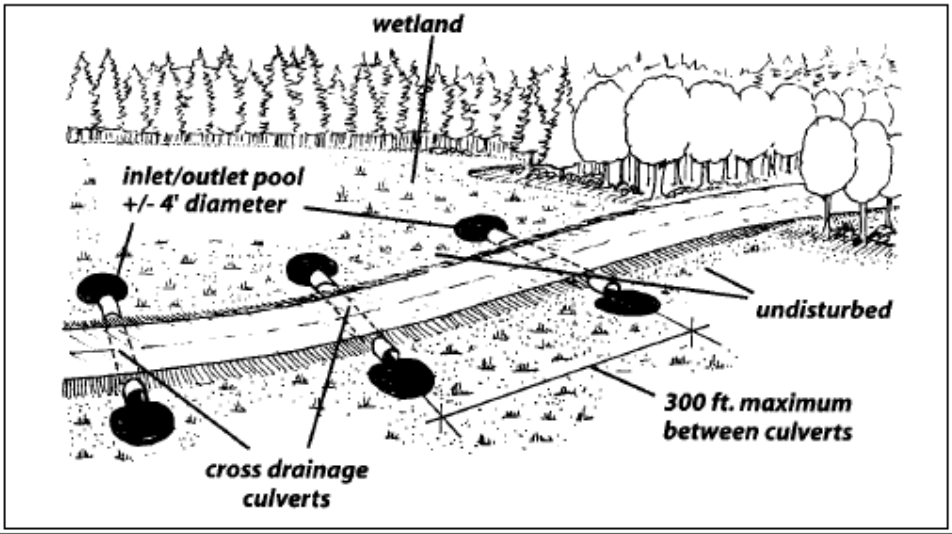
Rationale: To ensure the proper construction of roads in wet or low lying areas.

***Background*:** Constructing operative and long-service roads in wet or low-lying areas requires specific materials and procedures. The following technique was found effective in terms of production and overall job quality.

Procedure:

Wet or low-lying areas provide the biggest challenge for road builders. These areas generally have wet-organic or clay-dominated soils that do not withstand machine traffic. As a result, it is best to build the road above the organic layer, using wood (corduroy) and man-made (geo-textile, geo-grid, mill blanket) material that allows water to pass underneath the road. Corduroy should consist of hardwoods and off-species wherever possible. When building across wetlands, never break the organic layer parallel to the road as water will travel upwards and soak the sub-grade, resulting in unnecessary maintenance.

Prepare road sections with wet soils by placing wood (corduroy) then fabric on top of the organic layer prior to construction of the sub-grade. Pile dry fill-material on top of the wood and fabric to build the sub-grade. As the wood and fabric is being laid down and the sub-grade constructed, install cross drains underneath every 100 metres (300 ft), and in areas where water is ponding. Excavate 1 metre diameter inlet/outlet pools at both ends of the cross drains. This will provide a place for water to pool, and keep it off the road.



You will have to excavate dry sub-grade material from borrow pits outside of the wet area, as material in wet and low-lying areas (high clay content, wet, etc.) is often not suitable to construct the sub-grade. Also, trenching in wet areas causes the water within the wet-land to pond in the grubbed areas along the road.

If the distance to suitable material isn't close to work area, use dump trucks to transport the fill material (gravel) from the borrow pit to the fill site. When the excavation of material is complete, the borrow pits must be sloped or stabilized. Crown the road when the sub-grade construction is complete.

This Standard Operating Procedure covers the Significant Environmental Aspects relating to: maintenance of visual quality, potential for degradation of water quality, and potential for soil disturbance.

DEACTIVATING ROADS AND STREAM CROSSINGS

Rationale: To ensure the proper removal of stream crossings and drainage structures on road networks that will not be maintained in the future.

***Background*:** After harvesting or silvicultural operations are completed, some roads will not be used and therefore will not require regular road maintenance until prior to the next harvest. If feasible, stream crossing structures can be removed from these areas. In addition to recovering expensive crossing structures, this will prevent structures from becoming blocked, which could impede fish passage and the natural drainage patterns. Any recovered structures can then be re-installed in "active" areas.

Procedure:

When it becomes necessary to deactivate a road or recover a crossing structure, certain procedures need to be followed. First, obtain necessary approvals from all applicable regulatory agencies, provincial and federal. Next, before beginning work to deactivate roads and stream crossings, ensure no vehicles are inside the crossing to be deactivated. Rebuilding a deactivated crossing to rescue "forgotten people and vehicles" can be costly.

Remove temporary and permanent structures (bridges, culverts, brush mats, and arches) from below the high water mark. On winter roads this should be done prior to spring break-up. The Standard Operating Procedure R-01 provides detailed instructions on the removal of temporary crossings on winter roads, but the general process can apply to all crossing structures at any time of year. Leave brush in place on the approaches and banks above the normal high water mark, to ensure on-going stabilization. Remove sill logs/abutments used for temporary bridges **unless** doing so causes more environmental risk.

Slope (%)	Water Bar Spacing (m)
0-2	75-120
3-5	40-60
6-10	24-30
11-15	18-24
16-25	12-14
26-30	10-12
>= 30	9

When removing stream crossings from all-season roads, it is necessary to install rip rap for stabilization, from the toe of the slope to above the high water mark, the height of rip rap dependent upon the local soils. If there is no suitable rip rap material in close proximity to the site, it must be trucked in. Where necessary, filter fabric will be used in combination with the rip rap and hay, to minimize the potential of sedimentation.
Establish water bars at the beginning and end of the 30m no-grub zone to ensure no ditch water enters the stream. Steep road grades require water bars as well, at structured intervals, depending on slope. The adjacent table shows the interval distances that are recommended for effective control of road surface runoff.

After the crossings are removed, use hay to stabilize the crossing site and any other areas of exposed mineral soil in the no-grub zone. If large areas are disturbed, noninvasive seed or natural vegetation (from outside the no-grub zone) should be placed on exposed mineral soil. The natural vegetation has to be placed in such a manner, and in sufficient quantities, to ensure that re-rooting and stabilization will occur.

Signage and Closeout Procedures

When road structures are removed, it is the responsibility of the CBPPL Supervisor doing the removal to have a barricade constructed of man-made or natural materials, to impede vehicular traffic. The excavation of a prominent berm (0.75-1.0m in height and including boulders) is often used to slow down road vehicles upon approaching the deactivated crossing. Depending on the line of sight and distance to the deactivated crossing, a second berm may be needed to warn approaching vehicles. Berms can be excavated outside of the 30m no-grub zone, both inside the crossing before it is deactivated, and outside of the deactivated crossing.

Proper signage should also be erected when a structure is removed. All barricades/berms are to be marked with warning signs placed 30m from the barricade. The sign must be a minimum of 60cm x 60cm, bearing a STOP symbol and reflective tape. Barricade warnings must be placed from both approaches.

Finally, for inventory and storage purposes, structures like chutes, bridge sections and culverts should be brought to a central location that ideally has equipment to facilitate loading and un-loading.

ROAD CONSTRUCTION METHODS - STEEP SIDE-HILL TERRAIN

Rationale: To ensure the proper construction of roads in steep side-hill terrain.

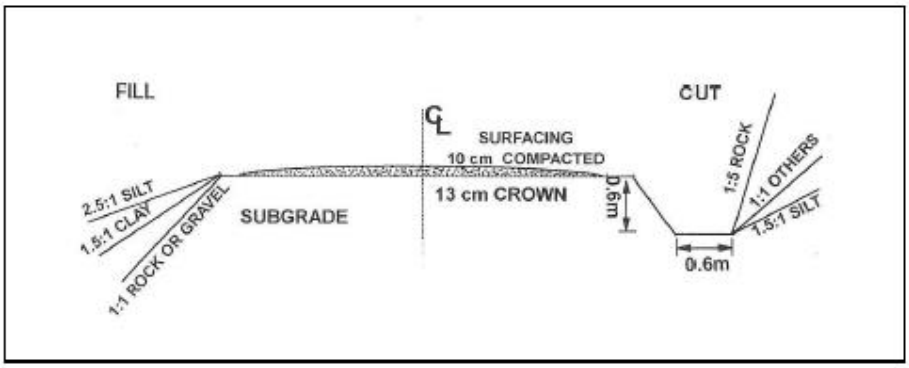
Background: Different techniques for constructing forest access roads on varying terrain were tested by selected contractors during the summer of 2005. The following technique was found effective in terms of production and overall job quality for steep side-hill terrain.

Procedure:

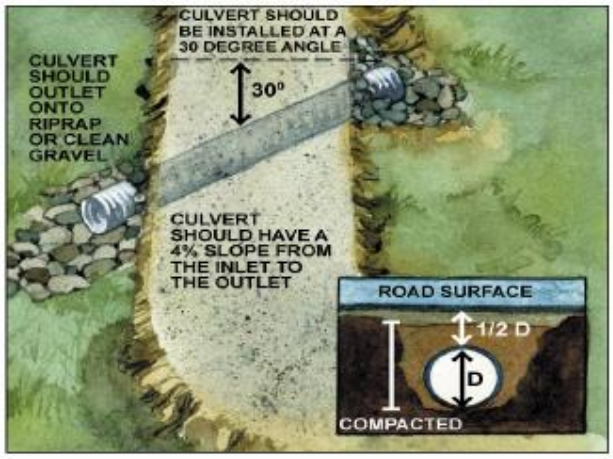
The steep side-hill terrain method is used on the side of hills where appropriate road construction materials exist ("rippable" ledge or glacial till materials). This type of terrain is beneficial as it generally promotes good drainage through in-sloping of the sub-grade, combined with the use of ditch relief culverts (cross drains) at properly designed intervals, to control water volume and velocity.

First, strip any woody and organic debris from the high side and move it to the low side of the road, to form a shoulder. The excavator or tractor will position itself on this shoulder when constructing the sub-grade. Next, trench or push sub-grade material from the high side to either the low side, or along the center of the right of way. Maintain the designated no-grub zone on both sides of any permanent waterbody. As successive loads are moved, pile or windrow this material, taking care not to mix large coarse fragments or woody material into the sub-grade.

Level the windrowed material by tractor or excavator, to produce a finished sub-grade. Establish a ditch line on the inside of the road. Ditches should not empty into streams of <u>any</u> size. Taper the cut bank to appropriate slope. This may be hard to achieve on excessively sloped terrain; however, you must slope the cut bank enough to prevent material from sliding and subsequently filling of the ditch below. The fill bank should be properly sloped and stabilized as well, to avoid the shoulder from slumping off.



Crown the sub-grade from the outside in (in-sloped), so that water will flow from the road surface into the ditch, resulting in little or no maintenance or safety issues. Out-sloped roads, which shed water from the road surface to the low side of the road, are less expensive to construct initially because they don't require a ditch or cross drains. However, out-sloped roads can develop maintenance and safety problems, because all ground and surface water from the road and cut bank travels across the road. During construction, ground conditions and available equipment can make crowning difficult. However, all efforts should be made to ensure that the subgrade drains. Final crowning will be a function of ballast, if necessary, and the use of a grader.



To control the volume and velocity of water on in-sloped roads, you must install ditch relief culverts (cross drains), to channel water to the low side at a designed frequency. This results in a drier road surface, and therefore increased trafficability and reduced maintenance costs. Install cross drains at a 30-degree angle to the road and slope them to a 4% grade for sufficient flow and lower maintenance. Determine the number of cross drains required by the following simple rule: **1 cross drain (or if the terrain permits 1 take-off ditch) at 750m intervals for every percent slope.** For example, a road with a 2% grade would require a cross drain or take-off ditch every 375m.

Building roads on a steep side-hill involves the movement of large amounts of material to achieve the desired grade and alignment characteristics. In addition, because it is impossible to construct wing ditches on side hills a sufficient numbers of cross drains (ditch relief culverts) are required to control water.

BALLAST AND BORROW PIT OPERATIONS

Rationale: To minimize the disturbance of soils, and prevent the degradation of water quality during ballasting operations.

Background: Ballasting operations are necessary to improve the load bearing capacity and traction of sections of roads that have poor subgrade material, or to put a top on roads where no final grade material is available. However, ballasting operations have the capacity to cause environmental damage to waterbodies, and the use of borrow pits has the potential for excessive soil disturbance. By following the procedures below, operators and supervisors will minimize the potential for environmental incidents during ballast operations.

Procedure:

Ballasting

- If possible, grade all roads to be ballasted prior to starting ballast operations, to reduce the amount of ballast material required and increase the efficiency of the dump trucks.
- Match the number of dump trucks to the road condition and the distance from the pit to the tractor/grader spreading the material. Too many trucks will cause congestion and wait times; not enough trucks will increase wait times for the excavator and the tractor.
- To maximize production, distance between turnarounds should not exceed 300 meters. Turnarounds can be a natural feature, a low ditch line, a cross-ditch berm, or can be made with the tractor.
- Sidings for dump trucks should occur every 300 meters, allowing a good flow back and forth to the pit.
- Trucks should spread their loads along the length of the road, to increase the efficiency of the tractor.
- Ensure operators are aware of the location of and restrictions associated with no-grub zones.

- Always ballast working your way <u>in</u> the road rather than on the way out. This way the dump trucks always travel on good material and compact it, revealing any bad spots to be resurfaced.
- Ensure that ballast materials and rock do not block ditches and culverts.
- Apply material to the running surface of the established sub-grade for a width of 3.5-5m (12-16ft.) and an average compacted depth of 10cm (4"). This will vary depending on road conditions.
- Include drop-trailer sidings in the ballasting, to prevent poor material from being brought to the road and damaging it.
- When crossing sections of peat bog or similar low-strength subgrades, place a layer of filter fabric or screen material from the paper machines on the subgrade before placing ballast on top of the fabric.

- While working around a no-grub zone, suspend activities during intensive rainfall, or when soils are saturated and there is a potential threat of erosion or sedimentation into a waterbody. Similarly, operations should cease if, due to the dump trucks' activity, roads begin to rut and there is a potential threat of sedimentation.
- Do not dump or spread material on bridges. When spreading ballast inside the 30 meter no-grub zone on either side of a watercourse, take care not to lose gravel in the ditches.
- To avoid dump truck downtime on long hauls when there is insufficient time to make another run, have alternate work closer to the pit, e.g., dump on another road, do work around load liners, etc.
- If the tractor has to be floated to another road in the same operating area, utilize the grader to keep the dump trucks operating.
- When ballast operations are complete, grade the road to obtain a proper crowning of the road surface, which will allow rain to drain off the road and into the ditches.

Borrow (Ballast) Pits

Borrow (ballast) pits are a source of suitable road subgrade or final-grade material located within the forest access road right-of-way. Sub-grade or ballast material cannot be obtained from any waterbody or from within the floodplain of a waterbody. It must be obtained from outside the buffer and trucked, pushed, or cast inside.

- To minimize the disturbance of productive land, use any existing borrow pits. When new pits are necessary, identify them well in advance of ballast operations, if possible.
- Locate borrow pits at least 60 meters from the nearest waterbody, and stay away from wetlands, highly erodible soils, and known sensitive areas. Avoid constructing pits up-hill from a watercourse to ensure sediment does not enter any waterbody.
- Test holes will be dug prior to establishing a borrow pit. Fill in all holes dug in unsuitable areas.
- If a good supply of coarse aggregate material is not available within a reasonable trucking distance (< 15 km), consider a crushing operation to reduce trucking costs.
- Once borrow pits are located, assess if it is necessary to install culverts at the entrance to avoid water build-up around the site. Ensure any water flow from the area around the borrow pit is dispersed properly.

- Strip and pile overburden off to the side to use later. Limit area stripped to the area needed to complete the current ballast job. Use all good material from each area of the pit before stripping more overburden.
- Do not excavate pits below the water table as it will cause the accumulation of water at the excavation site.
- Slopes shall be scaled, trimmed, and stabilized to prevent slides of material or falling rock.
- In a sand and gravel quarry, ensure that all overhanging trees, stumps, or overburden is removed within 5 meters from edge of excavation
- Maintain an adequate supply of hay and filter fabric to control sedimentation from site runoff.
- Once a borrow pit is exhausted, place the overburden back into the pit, and level and compact it.
- Landscape the sides of the pit to a 2:1 slope, or as low as is achievable, to ensure safety to the public and wildlife .
- Where there is a potential for sedimentation, place riprap, non-invasive seed, or sods of natural vegetation on the exposed mineral soil. The natural vegetation has to be placed in such a manner, and in sufficient quantities, to ensure that re-rooting and stabilization will occur.

GRADING FOREST ACCESS ROADS

Rationale: To ensure the maintenance of forest access roads through proper grading techniques and environmentally sound practices.

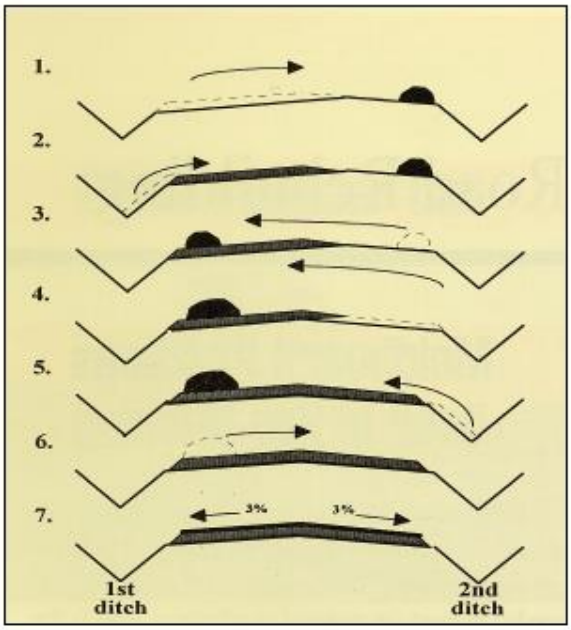
Background: Grading is an essential operation to maintain the traffic ability of the road. If done properly, grading promotes good crown, allowing for effective shedding of water from the road surface into the ditch.

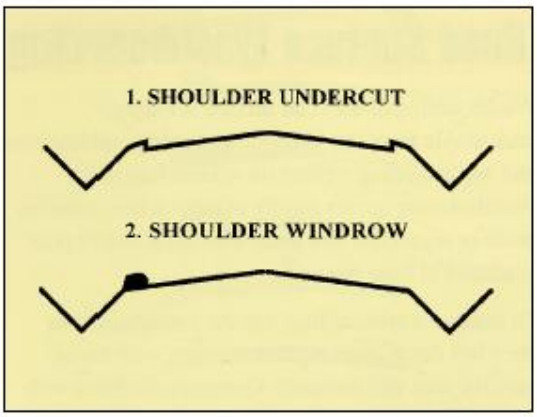
Procedure:

Road Grading

The following steps are used when grading forest access roads:

1. Windrow good cover material to the opposite side of the road from the first ditch that you intend to cut/ clean.
2. When cutting/cleaning the first ditch, place the excavated material on the shoulder and spread evenly across the uncovered side of the road from the shoulder to the centerline.
3. Windrow the stockpiled material back across the road on top of the excavated material that was spread.
4. Retrieve any good material that was under the original stock piled windrow and add it to the stockpiled windrow.
5. Cut/clean the second ditch and spread the excavated material evenly across the uncovered section of road.
6. Spread the stockpiled material across both lanes evenly.
7. Use the cover material to finish the appropriate road cross section. The correct specification is 0.05' per every foot for a 5" crown.





Common Problems

Avoid these common problems associated with grading:

Shoulder Undercut:
Grader establishes good crown but undercuts the shoulder, trapping water from shedding into the ditch line.

Shoulder Windrow:
Again grader establishes good crown but leaves a windrow along the edge of the road. This windrow traps water, saturating the road and reducing its traffic ability.

Grader Ditching

Maintenance of roadside ditches is necessary to maximize water flow and control. Ditching with a grader is best carried out under dry conditions.

- Use a very steep blade angle to cut and deposit the material between the machine tandems, part way up the road shoulder slope. This will help prevent spillage of material around the toe of the moldboard and consequent re-filling of the ditch.
- A second ditch pass may be required to bring this material from the ditch up on to the shoulder of the road.
- Rake out grass and other undesirable material and spread good material on the road surface.

When grading a road with a slope, create off-takes to allow water to disperse away from the road into well-vegetated areas. This will reduce the speed and volume of water travelling down the ditch, and filter sediment before water enters a waterbody. A forest road should also have cross-drainage culverts or off-takes 30 m. (100 ft.) before a crossing to allow water to runoff.

Grading Around Watercourses

Grading has the potential to introduce sediment into waterbodies if not done correctly. The operator must ensure the following measures are taken:

- When grading through any no-grub zone, ensure no material or sedimentation enters a waterbody.
- Suspend grading near no-grub zones during periods of intensive rainfall or when soils are saturated, to reduce the potential threat of erosion or siltation into a waterbody.
- Ensure that excess or oversized material is not allowed to block ditches or culverts.
- Ensure material being graded is not spread directly onto the running surface of any bridge; instead, feather out the material. Alternatively, leave a windrow of material on one side, cross the bridge, and return facing the other direction, to spread windrow away from the bridge.
- Ensure no windrows of material are left that may channel water downhill and into the stream.
- Maintain an adequate supply of filter fabric and hay on site to control sedimentation as needed.

Improper grading of the approaches has deposited material on the running surface of the bridge, creating the potential for sedimentation of the waterbody.

OPEN-BOTTOMED STRUCTURES FOR LARGE CROSSINGS

Rationale: To maintain natural stream characteristics, minimize the disturbance of soils, and prevent the degradation of water quality during the construction of open-bottomed structures for large crossings.

Background: Activities involved in the installation of structures for large crossings have the capacity to cause environmental damage around water bodies. Using sound environmental practices during installation can minimize impact to the environment and ensure a longer service life of the structure.

Watercourse crossing structures should be designed based upon the following criteria:
⇒ Structures have to be designed to handle the associated flows for the stream in question
⇒ Structures have to be designed based upon site characteristics and to ensure fish migration is maintained
⇒ Structures have to be designed to prevent erosion and sedimentation that adversely affect water quality

Procedure:

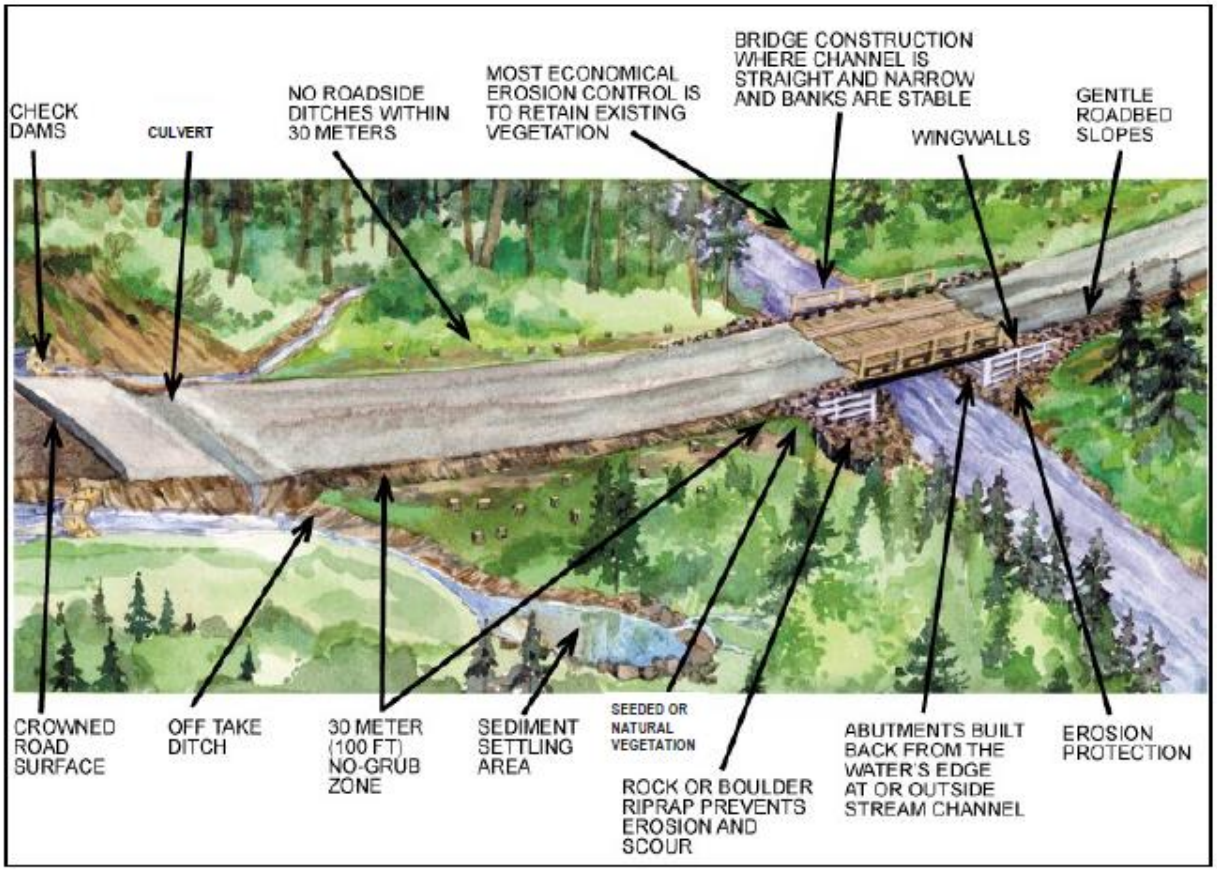
Approval Process

- Obtain permits from all applicable regulatory agencies.
- Permanent crossings on navigable waterways require Formal Approval from the Canadian Coast Guard prior to construction.

General Guidelines

The figure below shows a properly installed large crossing and site conditions. The following also apply:

- Remove excavated material from the immediate construction area so that heavy rains or high stream flows will not return them to the stream. Suspend construction during periods of intensive rainfall or when soils are saturated.
- Localize heavy equipment activity to minimize site disturbance. Perform excavations with a backhoe or excavator working from the bank. Do not use a bulldozer within the water body.
- Ensure that no woody debris or unmerchantable stems are allowed to enter any water body.
- To ensure compliance with guidelines concerning fuel, oil, hazardous products and garbage, see SOPs G-02 and G-03.

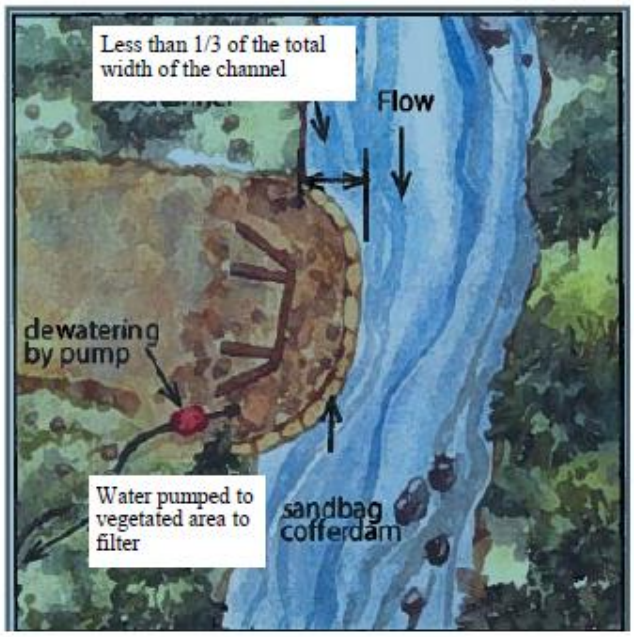


Specific Guidelines

- Maintain a 30-meter no grub zone on each side of the water body.
- The use of pretreated timber is preferred; however if on site application of any wood preservative to the bridge timber is necessary, it must be done a minimum of 15 meters from the nearest water body. The preservative must be completely dry before using the timber for construction.
- Concrete placement will be done according to proven safe practice, whereby displaced water is pumped onto a drainage strip, to ensure that no cement enters the stream.
- If backfill material must be obtained from a borrow pit, see SOP R-10 for guidelines.
- As work progresses, stabilize all potential erosion sites by grading cut banks and fill slopes, seeding, sodding, terracing, or riprapping. **Do not wait until the end of the project**. Large rock and riprap are to be placed along the approach fills to prevent material washing into the stream during peak runoffs. Approach embankments must also be riprapped, seeded, or sodded with natural vegetation to help prevent sedimentation. A layer of non-woven, geosynthetic fabric is to be applied underneath the rip-rap to further stabilize the bank and prevent erosion.
- Install cross-drains, take-off ditches, and settling ponds no closer than 30m on either side of the bridge, to allow the sediment in ditch water to be filtered out before entering the water body.
- The bridge 15 meter approach grade should be at a -1%
- The run way should completely cover the wood deck, as opposed to a central gap, used in previous bridges before 2022

Coffer Dams

- Excavation required for the construction of piers, abutments or multi-plate culverts shall be completed in the dry. (Where exceptions occur, consultation with the DFO is required).
- If construction cannot occur outside the stream banks, conduct excavation for piers, footings and abutments in a manner that separates the work area from the stream. Two acceptable methods are:
  a. Coffer dams constructed of sandbags or clean non-erodible material.
  b. Coffer dams constructed of material excavated from the footings, in combination with filter fabric or reclaimed mill fabric.
- Ensure coffer dam is of sufficient height and strength to handle anticipated water level fluctuations.
- Direct water pumped from coffer dams into a settling pond, filter fabric dam, or into an adjacent vegetated area, where it can be filtered before re-entering the stream.
- Block no more than one-third of the stream width at any time during construction.
- Remove coffer dams upon completion of construction and return the streambed to its original condition.



Fording

During bridge construction, it often becomes necessary for equipment to ford the stream for construction activities on the opposite side. When equipment must ford a stream, the following guidelines are to be followed:

- Locate fording sites outside the excavation area, away from any small brooks or bogs, and where stream banks are stable.
- Fording sites are to avoid any known fish spawning or rearing sites as identified on the operating map or directed by the contractor.
- Protect approaches to the stream with brush mat or corduroy to minimize damage to the stream banks.
- Establish streambed protection such as boom sticks, squared timbers or birches before equipment travels across.
- When fording sites are no longer required, restore the stream channel and banks to their original condition and stabilize using riprap, natural vegetation or seed. Any rut or other damage that may cause sedimentation in the stream must also be repaired to prevent sedimentation from being discharged into the stream.

This Standard Operating Procedure covers the Significant Environmental Aspects relating to: potential for degradation of water quality, and potential for soil disturbance.

Maintaining Water Quality On Scarification Projects

Rationale: To ensure that woody debris, slash and soils do not enter waterbodies as a result of scarification activities.

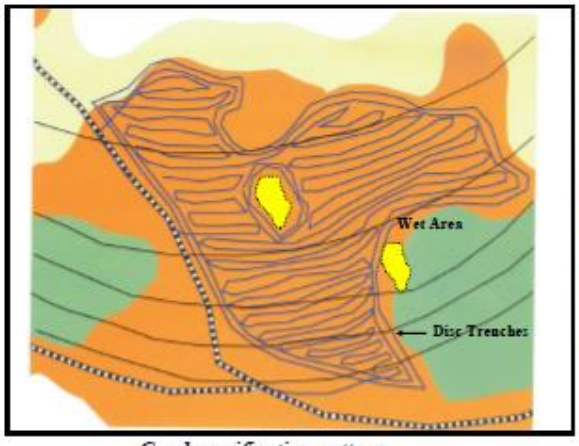
Background: Cutovers with insufficient regeneration require planting. Sites with heavy logging slash or a thick overburden of duff need mechanical scarification to expose optimal planting sites, so as to ensure the survival and performance of planted seedlings. Scarification is undertaken during the summer prior to a site's planting, and is achieved using a hydraulic-powered disc trencher, which rotates and creates down-pressure on a pair of discs. The angle of rotation and the penetration of the toothed-discs causes overlying debris to be peeled off and thrown outward, creating two continuous furrow planting trenches.

Normal Trench Spacing

Procedures:

Being prepared is the first step in preventing or minimizing water degradation as a result of scarifying cutovers. Maintain an adequate supply of filter fabric and hay on site, to be deployed if an incident occurs.

Double Perimeter



Good scarification pattern.

If possible, disc trench a double perimeter around the cut block first. This will help contain water within the treated cutover and avoid sedimentation in adjacent waterbodies. It also gives the operator room to turn around and continue disc trenching.

Establish a double perimeter on wet areas that are unsuitable for scarification. This will enable the operator to easily identify wet areas that are not well defined, and thus avoid getting the scarifier stuck. A stuck scarifier often must be dug out by an excavator, which creates excessive ground disturbance.

Do not align scarification trenches directly into streams or ditches. Empty trenches by a take-off ditch, into the surrounding vegetation, to allow water to filter out over the forest floor.

Trenches should not flow into ditches

Newly Scarified Area

Working on Slopes

For slopes between 10 and 15 percent, operate scarification equipment parallel to the slope, and take advantage of natural cross drainage provided by side hills. On slopes in excess of 15%, equipment must travel up and down slopes to avoid the risk of rollover. In these cases, create intermittent trenches (i.e.- for every 50m of trench leave a 2m section not scarified) or establish a double perimeter.

Place windrowed slash piles where it cannot be washed into streams during peak flooding conditions.

Crossing Ditches

Cross ditches where harvesting equipment previously crossed. If such crossings cannot be identified, select dry places to cross, well away from culverts. In very wet or soft areas, fill the ditch at the point of crossing with woody debris and cull trees. Remove the temporary crossing from the road ditch after the block has been scarified .

Slash in Ditch Crossing

Fording Streams

Ford streams with heavy equipment only when absolutely necessary. When fording is required, select the best possible location - a narrow point along the stream where the banks are low and the streambed is made up of rocky material. Avoid any known fish spawning or rearing sites. Protect the stream bed by placing slash and woody debris along both approaches to the fording site. Place tops, birches and woody debris in the streambed for protection. Remove these materials when fording activities are no longer required.

Appendix B – 2026 Environnemental Protection Guidelines Date Effective Jan 1, 2026

Found in 5YP Appendix.

Appendix C – Emergency Response Test – Majors Contracting – Gales Brook FMD16

Kruger Publication Papers	Blank Forms Manual Manual # 7	EMS Reference 4.4.7
	Emergency Response Test Report	C-FRM-04 Page ___ of

1. Test Coordinated By: _____Markus Flynn_____

Date of Test: __April 4 2025_ Location: ___Gales Brook_____

Contractor: ___Majors Contracting Ltd_____

2. Outside Agency Contact

Outside agencies (DFRA, DOE, emergency services – ambulance) should be contacted by person conducting test prior to test being conducted. They should be told that a test of the Company's ER Plan is being conducted and that they should expect a call during the simulated test. They will, of course, not be expected to respond, but to provide information regarding how it would respond if needed (i.e. how long it would take to get to the site, recourses available).

Agency contacted before test: _____ Date: _____

Contact name: _____ Time: _____

3. Section(s) of the *Emergency Response Procedures Manual* tested:
Sedimentation

4. Emergency Response team:

Agency contacted by team: _____

Response agency aware of ER Marshalling point? Yes/No

Response *(what the agency stated they would do were this a real emergency; i.e send waterbomber, personnel, ambulance, estimated time of arrival)*: _____

_____

_____

5. Describe Test and Results *(see possible scenarios on page 2)*: Time start:1pm___ Time stop:___1:30pm

At Approx. 1pm Rodney Gray who was operating excavator noticed a lot of muddy water running down the road toward a brook. He noted the water would probably make it to the brook and cause siltation. He called out to the supervisor over the radio and told him the situation. The supervisor quickly grabbed some hay bales and filter fabric from the trailer and went to the check out the situation. By this time Rodney cut a track to direct the water off the road, into the ditch. When Markus arrived with the hay Rodney began putting it in the ditch and constructed a damn with the filter fabric. This helped slow the flow of water and filter out some sediment before the water reached the brook. We left the temporary damn in place until all construction was completed in the area to ensure there were no issues in the future at that location. We reviewed the sedimentation procedure in the Emergency Response Book and were satisfied with the results of the test. We then checked to see if there was sufficient supply of hay bales in our trailer, there did not. Markus will insure it is replenished. Markus Also reviewed the results with the remaining crew members at end of day to remind all to watch for possible sedimentation and to report when seen.

_____

_____

_____

_____

6. As a result of the test, were revisions necessary to the Manual or other EMS documents?

____ Yes __X__ No. If Yes, explain recommended change:

7. Was the response to the test appropriate?

__X_ Yes_____ __ No_ Please explain:

Print Name: _____Markus Flynn_____ Signature: _____

Date: __ April 4 2025_ *Attach photos to report and forward to Environmental Management Coordinator.*

Possible scenarios to use when conducting ER Tests:

Forest fire/Machine fire:
Part 1

- Use ribbon to mark the perimeter of the "fire"
- Record the time and then notify someone on jobsite of situation *(notify employee on roadside or in woods/ notify operator in equipment or call foreman on radio)*
- When you report the fire to this person, include details about weather, wind direction and speed (*this allows for some variety in the test - they can either set up the pump and fight the fire or if the fire will spread too fast, the best option would be to evacuate the entire crew)*
- **Go to Part 2**

Siltation:
Part 1

- Note the location of a "silted" stream
- Record the time and then notify someone on jobsite of situation *(notify employee on roadside or in woods/ notify operator in equipment or call foreman on radio)*
- When you report the siltation to this person, include details about weather *(raining, sunny)* and where the stream leads *(does it run into a pond, salmon river)*
- **Go to Part 2**

Fuel/Oil spill:
Part 1

- Set up a "spill" *(by tipping over a bucket of used vegetable oil, spilling a can of water colored with food coloring or outlining/marking an area on the ground)*
- Record the time and then notify someone on jobsite of situation *(notify employee on roadside or in woods/ notify operator in equipment or call foreman on radio)*
- **Go to Part 2**

Medical (e.g. Electrocution, Broken Bone, Heart attack, Stroke, Allergies, Amputation, Eye Injury)
Part 1

- Note the location of the incident in advance, and have someone at the scene act as the victim.
- Record the time and then notify someone on jobsite of situation
- Make sure employees with first aid training are notified
- **Go to Part 2**

Part 2

- Observe how the crew responds and record details and time of actions.
- After the test is complete, assemble employees present and review the ER Plan for the section of the plan tested *(Go over procedures and discuss positive aspects of the test that just occurred and how we can improve response).*
- Be sure to check Section 1.3 to ensure that plan has been updated and whether members of the ER team were present for the test*(as many employees as possible should be involved in the test).*

Appendix D – List of Environmental Aspects and Impacts

Figure 4-1 Environmental Aspects for Harvesting

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
Cutting & bunching, feller buncher	Establishment of buffers	- Water temperature - Wildlife corridor/habitat	Potential for fuel spill	- Soil contamination - Water contamination
	Exhaust emissions	Reduced air quality		
	Retention of wildlife trees	Habitat		
	Collection or disposal of garbage	Pollution		
	Fibre recovery	Fibre utilization		
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration - Carbon release from soil		
	Maintenance of visual quality	Reduced visual quality		
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Potential for fire	- Reduced air quality - Loss of equipment	Forest Fire	- Reduced air quality - Habitat loss - Water contamination - Harm to human health
CTL with mechanical harvester	Establishment of buffers	- Water temperature - Wildlife corridor/habitat	Potential for fuel spill	- Soil contamination - Water contamination
	Exhaust emissions	Reduced air quality		
	Retention of wildlife trees	Habitat		
	Collection or disposal of garbage	Pollution		
	Fibre recovery	Fibre utilization		

Figure 4-1 Environmental Aspects for Harvesting

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
	Brush mats	- Soil protection - Regen protection		
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration - Carbon release from soil		
	Maintenance of visual quality	Reduced visual quality		
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Potential for fire	- Reduced air quality - Loss of equipment	Forest Fire	- Reduced air quality - Habitat loss - Water contamination - Harm to human health
CTL Processing in bush & Processing road side	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Brush mats	- Soil protection - Regen protection		
	Collection or disposal of garbage	Pollution		
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration - Carbon release from soil		
	Fibre recovery	Fibre utilization		
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		

Figure 4-1 Environmental Aspects for Harvesting				
Activity/Service	**Environmental Aspects and Impacts**			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
	Potential for fire	- Reduced air quality - Loss of equipment	Forest Fire	- Reduced air quality - Habitat loss - Water contamination - Harm to human health
Forwarding	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Fibre recovery	Fibre utilization		
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration - Carbon release from soil		
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
Skidding	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Fibre recovery	Fibre utilization		
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration - Carbon release from soil	Potential for excessive soil disturbance	- Rutting - Compaction - Erosion - Carbon release from soil

Figure 4-1 Environmental Aspects for Harvesting				
Activity/Service	**Environmental Aspects and Impacts**			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
Extraction trail construction	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration - Carbon release from soil		
	Collection or disposal of garbage	Pollution		
	Maintenance of visual quality	Reduced visual quality		
	Potential for degradation of water quality	• Sedimentation • Pollution • Turbidity • temperature		
Roadside wood storage				
	Collection or disposal of garbage	Pollution		
	Potential for soil disturbance	- Rutting - Compaction - Erosion - Disturbance to regeneration		
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Fibre recovery	Fibre utilization		

Figure 4-2 Environmental Aspects for Forest Roads

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
Grubbing	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Fibre recovery	Fibre utilization		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
	Soil disturbance	Compaction	Potential for excessive soil disturbance	- Rutting - Compaction - Erosion - Carbon release from soil
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
Ditch construction	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Fibre recovery	Fibre utilization		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
	Soil disturbance	Compaction	Potential for excessive soil disturbance	- Rutting - Compaction - Erosion - Carbon release from soil
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
Sub-grade construction and Final Grading	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		

Figure 4-2 Environmental Aspects for Forest Roads

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
	Soil disturbance	Compaction	Potential for excessive soil disturbance	- Rutting - Compaction - Erosion
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
Stream crossing (Bridge construction)	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
	Protection of fish habitat	Maintenance of fish habitat	Potential for habitat damage	Reduction in fish habitat
Stream crossing (Culvert installation)	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
	Protection of fish habitat	Maintenance of fish habitat	Potential for habitat damage	Reduction in fish habitat
Ballasting/burrow-pit construction	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Fibre recovery	Fibre utilization		
	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
	Soil disturbance	Compaction		

Figure 4-2 Environmental Aspects for Forest Roads

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
Grading	Exhaust emissions	Reduced air quality	Potential for fuel spill	Soil and water contamination
	Fibre recovery	Fibre utilization		
	Collection or disposal of garbage	Pollution		
	Soil disturbance	Compaction	Potential for excessive soil disturbance	- Rutting - Compaction - Erosion
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		

Figure 4-3 Environmental Aspects for Silviculture

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
Planting	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Collection or disposal of garbage	Pollution		
Scarification	Soil disturbance	Compaction	Potential for excessive soil disturbance	- Rutting - Compaction - Erosion
	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Collection or disposal of garbage	Pollution		

Figure 4-3 Environmental Aspects for Silviculture				
Activity/Service	**Environmental Aspects and Impacts**			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Maintenance of visual quality	Reduced visual quality		

Figure 4-4 Environmental Aspects for Transportation				
Activity/Service	**Environmental Aspects and Impacts**			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
Personnel transportation	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Collection or disposal of garbage	Pollution		
Transporting wood	Exhaust emissions	Reduced air quality Carbon & GHG emissions	Potential for fuel spill	- Soil contamination - Water contamination
	Collection or disposal of garbage	Pollution		
	Fibre recovery	Fibre utilization		
Transporting equipment	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Collection or disposal of garbage	Pollution		
Loading wood	Exhaust emissions	Reduced air quality	Potential for fuel spill	- Soil contamination - Water contamination
	Collection or disposal of garbage	Pollution		
	Fibre recovery	Fibre utilization		

Figure 4-5 Environmental Aspects for Support Services

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
Storage and handling of fuels	Potential for fuel spill	- Soil contamination - Water contamination		
	Collection or disposal of garbage	Pollution		
Storage and handling of other hazardous materials	Potential for hazardous product spill	- Soil contamination - Water contamination		
	Collection or disposal of garbage	Pollution		
Equipment maintenance	Potential for fuel spill	- Soil contamination - Water contamination		
	Collection or disposal of garbage	Pollution		
Waste disposal, trash	Collection or disposal of garbage	Pollution		
Waste disposal, used equipment	Collection or disposal of garbage	Pollution		
	Potential for fuel spill	- Soil contamination - Water contamination		
Waste disposal, hazardous materials	Collection or disposal of garbage	Pollution		
	Potential for hazardous product spill	- Soil contamination - Water contamination		
Operational layout (foreman)	Maintenance of visual quality	Reduced visual quality		
	Collection or disposal of garbage	Pollution		
	Retention of wildlife trees	Habitat		
	Establishment of buffers	- Water temperature - Wildlife habitat		
	Fibre recovery	Fibre utilization		

Figure 4-6 Environmental Aspects for Forest Management Planning

Activity/Service	Environmental Aspects and Impacts			
	Normal Conditions		Abnormal Conditions (Emergency)	
	Aspect	Impact	Aspect	Impact
Wetlands protection	Establishment of buffers	- Water temperature - Wildlife habitat		
	Maintenance of visual quality	Reduced visual quality		
	Retention of wildlife trees	Habitat		
Road location	Potential for degradation of water quality	- Sedimentation - Pollution - Turbidity - Temperature		
	Maintenance of visual quality	Reduced visual quality		
Compilation of management plans	Establishment of buffers	- Water temperature - Wildlife habitat		
	Maintenance of visual quality	Reduced visual quality		

Appendix E – EMS #1 Inspection

End-of-Month Check In

Contractor		District/Operating Area	
Month		Inspector/Supervisor	

Item #	Description	Finding	Comments
1-0-11	Awareness of ER plans and site special considerations		
2-0-1	Fuel/oil > 100m from waterbodies #	#	
2-0-1	PWSA Area Permit requirements met		
2-0-7	No oil/fuel leaks/drips from equipment		
4-0-2	Buffer zones maintained #	#	
4-0-5	Sediment control on site		
4-0-13	Government approval to deviate from guidelines		
5-0-4	Acceptable stump heights based on season		
5-0-6	No excessive butt junking		
6-0-3	Support facilities >100m from waterbodies #	#	
6-0-4	All garbage removed from site		
6-0-6	Operations within approved area		
9-0-10	Truck ramps in acceptable condition		
9-0-19	Road signs in place		
9-0-19	Other safety signage in place		
9-0-14	Communications in all equipment		

✓ - Satisfactory ◯ - Opportunity for Improvement X - Deficiency N/A - Not Applicable # - Incident Report Required

Riparian Crossings (provide coordinates & Pictures)

Crossing 1		Crossing 3	
Crossing 2		Crossing 4	
Pictures Sent In	Y / N		

Preventative Action Log

Date	Action

Emergency Response Test

Emergency Response test this month? Y/N	Test Type:	Submitted? Y/N

Monthly Leak Report

Week	# of Fluid Related Machine Repairs	# of Observable Leaks (Cleaned Up)
1		
2		
3		
4		
5		

Appendix F – EMS #2 Inspection

EMS Compliance (No. 2) Inspection

	Inspection Key		**Contractor:**						**Inspector 1**						
		Documentation Evidence	**Harvesting System:**						**Inspector 2**						
		Employee Questions	**Operating Area:**						**Inspection Period:**						
			Forest Management Distric						**Date:**						
Significant Environmental Aspects (SEAs)			1. Release to water and land						3. GHG emissions & climate change						
			2. Natural resources management						4. Fire						
SEAs	**No.**	**Inspection Item**	**Observations**	**Value**	**Achieved**										
	1-0-0	**Documentation on site:**	Possible 40												
	1-0-1	Forest / Environmental Policy posted on job site		2	*										
4	1-0-2	Provincial Fire Season Operating Permit (N/A to Ballast only)		4											
	1-0-3	Federal Stream Crossing Authorizations (N/A to Ballast only)		2											
	1-0-4	Provincial Stream Crossing Approvals		2											
	1-0-5	Provincial Protected Water Supply Area Approval		2											
	1-0-6	Emergency Response Plan/Hazardous Products		4											
2	1-0-7	SOP binder on jobsite		2	*										
	1-0-8	Proof of waste oil disposal		4	*										
1	1-0-9	Pre-Work Form posted on Jobsite		2											
	1-0-10	Employees aware of and know location of ER Plans/PWSA/Spec. Consid.		4											
	1-0-11	Monthly check book completed		8											
	1-0-12	Adequate Stream Crossing Notification		4											
			Subtotal												
	2-0-0	**Fuel/Oil Storage, Handling, and Disposal:**	Possible 60												
	2-0-1	Fuel/Oil > 100m from waterbodies (or PPWSA permit requirements)		2	#										
1	2-0-2	Fuel storage tanks registered/placarded/in good condition		4											
1	2-0-3	Slip tanks/containers (use/condition, secured, spill kit/fire ext.)		8											
1	2-0-4	Servicing > 30m from waterbodies (or PPWSA permit requirements)		2											
1	2-0-5	No drips/leaks from fuel tanks or hoses		6											
1	2-0-6	Proper refueling procedures followed/TDG certificate		4											
1	2-0-7	No drips/leaks from equip. hydr./fuel hoses;		6											
1	2-0-8	Minor fuel/oil spills and stained soil		8											
1	2-0-9	Spill kits on all equipment; rupture seal on Ballast Truck		4											
1	2-0-10	Containment basin for fuel, gas, and oil storage/used batteries		6											
1	2-0-11	Large spill kit on site		4											
1	2-0-12	Employees know and understand fuel/oil guidelines		4											
1	2-0-13	TDG Equivalency Certificate		2											
			Subtotal												
	3-0-0	**Road and Trail Construction:**	Possible 48												
	3-0-1	Ditches free of debris or obstructions		4											
1,2,3	3-0-2	No debris in waterbodies/centerline brooks		6											
1,2,3	3-0-3	Equipment activity near waterbodies minimized		6											
1,2,3	3-0-4	Temporary crossings: installed, used, **maintained**, removed		6											
1,2,3	3-0-5	Culverts free of debris or obstructions		6											
1,3	3-0-6	Right-of-ways narrowed through buffer zones		4											
1,2,3	3-0-7	Employees know rd/trail const. guidelines		6											
1,2,3	3-0-8	No-grub zone maintained		6	#										
1,2,3	3-0-9	Borrow pits > 60m from waterbodies **(Ballast)**		4											
				Subtotal											
	4-0-0	**Harvesting:**	Possible 58												
1,2	4-0-1	Buffer zones & boundaries flagged prior to harvesting		4											
1,2	4-0-2	Buffer zones maintained		6	#										
3	4-0-3	Brush mats properly prepared		2											
1,2,3	4-0-4	Erosion control measures in place on trails		6											
1,2,3	4-0-5	No sediment entering waterbodies as a result of harvesting		6	#										
1,2,3	4-0-6	Extraction trails located in acceptable locations		6											
1,2,3	4-0-7	No unnecessary trails or disturbance created by machines		6											
1,2,3	4-0-8	Equip. did not cross bogs or wetlands w/o approval		4	#										
1,2,3	4-0-9	Trails cut off (or rehabilitated if necessary)		6											
2	4-0-10	Min. of 10 wildlife trees per ha. left on operating areas/FECVs		4											
1,2	4-0-11	Employees know and understand harvesting guidelines/ISO/SFI		6											
	4-0-12	Gov't approval to deviate from guidelines		2											
				Subtotal											
	5-0-0	**Fibre Utilization:**	Possible 34												
2	5-0-1	Tops of harvested trees ≤ 8 cm		4											
2	5-0-2	Stump heights < 15 cm or acceptable for winter conditions		8											
2	5-0-3	No excessive butt junking/ junks <=30cm		4											
2	5-0-4	Merchantable trees/ brows left on cutover/ roadside		6											
2	5-0-5	Merchantable timber cut in block/ leave areas		6											
2	5-0-6	Employees know and understand utilization guidelines		6											
				Subtotal											
	6-0-0	**General:**	Possible 42												
1,2,3	6-0-1	Hay on site for sediment control		4											
1,2,3	6-0-2	Filter fabric on site for sediment control		2											
1,2,3	6-0-3	Support facilities > 100 m from waterbodies		4	#										
1,2	6-0-4	All garbage removed from site		6											
1,2,3,4	6-0-5	Fire equipment on site and in good working order		6											
	6-0-6	Operations within approved operating areas		6	#										
	6-0-7	Prior directives corrected - last #2 inspection		8											
	6-0-8	Deficiencies corrected - # 3 Inspections		6											
													Subtotal		
									Total Possible 282 points				**Overall Subtotal**		

√ - Satisfactory (Full Marks) **O - Needs Improvement (1/2 Marks)** **X - Deficiency (0 Marks)** **N/A - Not Applicable**

 # Environmental Incident Report Requi *** Only required on main operation when operations are split**

Appendix G – EMS #3 Inspection

Harvest Area Completion (No. 3) Inspection

Kruger

To be completed by CBPPL Staff or designate

Contractor		Harvest System	
Operating Area		FMD	
Date		Inspector(s)	
Year and Season of Harvest			

#2 Insp. Item No.	#3 Insp. Item No.	Inspection Item	Observation	Comments
2-0-0	***1-0-0***	***Fuel/Oil Storage, Handling, and Disposal:***		
2-0-8	1-0-1	Minor fuel/oil spills and stained soil cleaned up		
3-0-0	***2-0-0***	***Road and Trail Construction:***		
3-0-1	2-0-1	Ditches free of debris or obstructions		
3-0-2	2-0-2	No logging debris in waterbodies/centerline brooks		
3-0-4	2-0-3	Temporary crossings removed		
3-0-5	2-0-4	Culverts free of debris or obstructions		
4-0-0	***3-0-0***	***Harvesting:***		
4-0-2	**3-0-1**	Treed buffer zones maintained		
4-0-7	3-0-2	No unnecessary trails or disturbance created by machines		
4-0-9	3-0-3	Trails cut off (or rehabilitated if necessary)		
4-0-10	3-0-4	Min. of 10 wildlife trees per ha. left on operating areas		
4-0-10	3-0-5	Maintenance of species at risk and FECV species		
5-0-0	***4-0-0***	***Fibre Utilization:***		
5-0-5	4-0-1	Felled merch.trees/brows left on cutover/roadside landings		
5-0-7	4-0-2	All merchantable timber cut in block		
6-0-0	***5-0-0***	***General:***		
6-0-4	5-0-1	All garbage removed from site		
6-0-6	**5-0-2**	Operations within approved operating areas		

Are there any borrow pits on site? **Y / N** Do they require rehabilitation? **Y / N**

Any deficiency is an Automatic Fail

√ **- Satisfactory** **X - Deficiency**

Notes:

Minimum Acceptable Score 100 % ***Sign - Inspector***

Pass(P) or Fail(F) ***Sign - Supt Responsible for Contractor***

Document valid for 48 hours from date printed. Check CBPP Woodlands EMS for most current version