LP Canada Ltd.

Swan Valley Forest Resources Division

STANDARD OPERATING GUIDELINE

FOREST ROADS AND MAJOR STRUCTURES

Revised: August 30th, 2018

Contents

STANDARD OPERATING GUIDELINES (SOG's)

1.0 General Overview

LP Canada Ltd. (LPC) is committed to working closely with surrounding communities that may be affected by forest management operations and to ensuring orderly development of the forest resource to accommodate all forest values.

Originally LPC included a group of Standard Operating Procedures (SOP's) in Section 9 of the 10 Year Forest Management Plan (FMP). With the subsequent development of an Environmental Management System (EMS) for the Swan Valley Operations, it is appropriate to adapt the original SOP's into a complimentary set of Standard Operating Guidelines (SOG's) within the EMS.

Louisiana-Pacific Canada Ltd. is committed to the implementation of ecosystem based management within FML #3 and is presently developing the required infrastructure. This includes the development of an ecosystem based resource inventory, adjustments to planning and operational practices and the research necessary to achieve a better understanding of the ecosystems present and the processes occurring within them.

1.1 Sustainable Forest Management (SFM)

The Canadian Council of Forest Ministers (CCFM) began a process in 1993 to define, measure and report on the forest values Canadians want to sustain and enhance. The CCFM, along with technical and scientific advisors to lend support, consulted with officials and scientists of federal, provincial and territorial governments, experts from industry, the academic community, non-governmental organizations, the Aboriginal community and various other interest groups. The results of these consultations were documented in *Defining Sustainable Forest Management: A Canadian Approach to Criteria and Indicators* (1995). The development of these criteria and indicators (C & I) was an important step in meeting Canada's domestic commitments on sustainable forest management.

The purpose of the Criteria and Indicators are to provide a common understanding and scientific definition of sustainable forest management in Canada. Together they form a framework for describing and measuring the state of our forests, forest management practices, values and progress towards sustainability. This information is then used to develop forest management policy and to determine areas where research is required to fill information gaps and develop new technologies. The C & I approach not only recognizes that forests are ecosystems but also realizes forests provide a wide range of social, economic and environmental benefits to Canadians and realizes the necessity of public education and participation in the process of sustainable forest management.

There are six criteria relating to sustainable forest management. Each criteria has been broken down into 27 elements to yield 83 indicators to help track progress in achieving sustainable development and social, economic and environmental objectives. The six criterion of SFM are:

- Conservation of biological diversity.
- Maintenance and enhancement of forest ecosystem condition and productivity.
- Conservation of soil and water resources.
- Forest ecosystem contributions to global ecological cycles.
- Multiple benefits of forests to society.
- Accepting society's responsibility for sustainable development.

LPC is striving towards sustainable forest management, as defined by the above criterion, in its forest management practices. These SOG's are a partial fulfillment of SFM. The Stakeholders Advisory Committee plays an integral role in the public participation, contribution of societal values and knowledge dissemination component of SFM. Pre-harvest surveys, permanent sample plots, ecological monitoring and research programs contribute to SFM by providing baseline data, site specific ecological information and enable LPC to identify areas where more information is required.

1.2 Objectives of the Specifications & SOG's

The EMS and SOGs provide a framework for the company to achieve and maintain a particular standard, as set out in these documents as well as the approved 10 Year FMP, Environment Licence 2191E and the FML #3 Agreement.

- The government's objectives will be met by the forest management planning process described in the EMS and the SOGs.
- Provide direction to LPC for planning, implementing and monitoring timber harvest operations on the forest management area.
- Outline the planning and operating standards of Ecosystem Based Management for timber harvest, road development, reclamation and integration of timber harvesting with other forest uses.
- Describe the planning and submission requirements for timber harvest operations.
- The EMS and SOGs are dynamic enough to provide sufficient flexibility to accommodate most site conditions. The principles in the EMS and SOGs are considered to be the normal expectations for harvest operations.
- The EMS and the SOGs are expected to be applied using sound judgment based on practical experience and technical competence.
- The EMS and SOGs provide documentation, structure and accountability associated with a particular activity.

Ecosystem based management refers to the development of management systems that attempt to simulate ecological processes with the goal of

maintaining a satisfactory level of diversity in natural landscapes and their pattern of distribution in order to ensure the sustainability of forest ecosystems and forest ecosystem processes (Canadian Council of Forest Ministers, 1997).

The SOGs are unique to FML #3. They have been developed with specific reference and compliance to Federal and Provincial legislation, regulations and guidelines, and the requirements and conditions of the FML #3 agreement signed in September 1994, with the Province of Manitoba. They are also consistent with the requirements as set out in Environment Act License 2191E issued to LPC in 1996.

Many of the provisions, options and approaches in these SOGs may be considered for other jurisdictions, but they cannot be considered as a precedent for those jurisdictions. These provisions are based on concerns and conditions specifically related to operations within FML #3. They take into account potential future uses. They are an interrelated set of provisions, and not stand-alone solutions.

The EMS and SOGs ensure LPC meets or exceeds government regulations. They cannot, however, be considered a final position. Rather, they are part of a dynamic plan that will adapt or adjust as determined by legislation or societal attitudes, interests and concerns. As the SAC will assist LPC throughout the years in operational planning, ongoing review of the EMS and SOGs will be part of LPC's adaptive management planning.

2.0 Background and Objectives

This document includes information pertaining to general operating guidelines used in the development, maintenance and decommissioning phases of forest access roads in Forest Management License Area #3 (FML 3). Detailed forest road development plans are presented in Annual Operating Plans (AOP) which are submitted to both Federal and Provincial Government Agencies for review, mitigation and subsequent approval. These plans include information on road classes, right-of-way (ROW) widths, road lifespan, access control (if any), road closure/ retirement plans and all watercourse descriptions and proposed crossing types to be used along the access route. All forest access road and water crossing information included within the AOP is stored in a geographical information system (GIS) database known as Woodlands the System.

LPC has recognized the potential effects on terrestrial and aquatic environments associated with forest road development and water crossings and is committed to implementing best management practices and ensuring compliance with Federal and Provincial laws, regulations and guidelines to avoid or minimize environmental effects from forest road development. Therefore, the guidelines presented within this document will develop a framework that will assist LPC in implementing sustainable forest management practices by ensuring the following key objectives are achieved in the planning, operation and decommissioning phases of forest road development activities in FML 3. These key objectives are:

- Maintain water quality and prevent deposition of slash, debris and sediment into aquatic environments;
- Maintain biodiversity in both terrestrial and aquatic environments;
- Minimize disturbance to fish-bearing or potentially fish-bearing habitats;
- Maintain natural surface run-off and stream flow patterns;
- Maintain fish migration and water flow within active water crossings;
- Protect and maintain known unique and critical habitats;
- Minimize loss of productive forest lands;
- Protect traditional and cultural resources identified.

3.0 Forest Road Planning Process

Several criteria are taken into consideration when forest roads are initially designed on digital aerial photos during the planning phase of road development. These are:

- topography
- location and types of watercourses and wetlands,
- proximity to lakes and unique features,
- critical wildlife habitat locations,
- location of existing roads and trails
- cultural features or other protected areas
- number of cutblocks to be accessed
- season of use
- other users

Once a road system is designed, LPC staff ground truth the designed road system to ensure that the proposed road location will not conflict with any of the aforementioned criteria. The road will then be given a classification based on the level of access required within the operating area and season of harvest.

Table 3.1 Forest Access Road Classification

Road Type	Road Class	Description
All Weather Roads	I and II	Class I and II roads are all-weather roads. Class I roads are graveled for 20 years or more. Class II roads are graveled for up to 20 years. Roads in this group require precut rights-of-way of 45m and 30m respectively before roads are constructed.
Dry Weather Roads	Classes III and IV	Class III and IV roads are operable under dry weather. Class III roads provide access to harvest areas for two to seven years. They are low grade roads with some grade work and ditching where necessary, and may include gravel. Class IV roads provide access to harvest areas for one to five years.
Seasonal Roads	Classes V and VI	Class V roads are trails with little to no development and are typically winter roads.

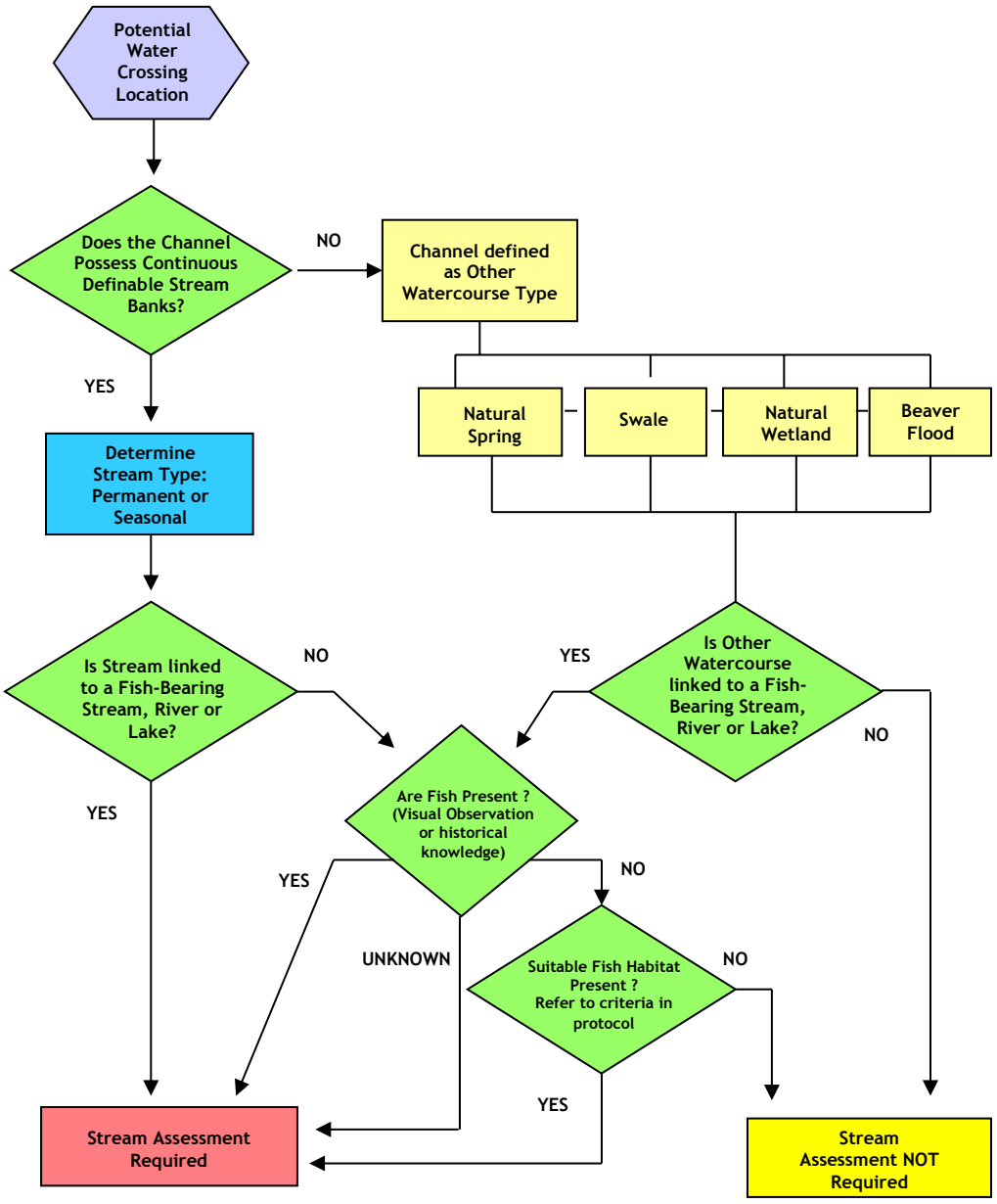
During the field inspection, LPC staff will document characteristics of all water crossings that exist along the proposed road location and digitally photograph the proposed point

of crossing, upstream and downstream portions of the watercourse. Decisions are later made by the Area Planner whether or not the proposed water crossing locations require a more comprehensive assessment that would examine both the physical and biological characteristics of the watercourse.

Several criteria are used to make that decision which are based on both physical and biological components present within the watercourse and direct or indirect linkages to known fish bearing streams, rivers or lakes (see Figure 1). If a comprehensive assessment is required, it will be completed a year prior to proposed road construction to ensure all the information collected is used to make informed decisions regarding the proposed location of crossing, the water crossing type and erosion control measures to be used, start –up date for construction, length of time the crossing will be in place, and rehabilitation measures that will be required to restore the site back to a near natural state.

All this information is then synthesized into an access management prescription for the operating area, pre-mitigated by LPC, Department of Fisheries and Oceans, Manitoba Conservation and the SAC. The AOP is then submitted to both the Federal and Provincial Governments for final review.

Figure 3.1 Fish-Stream Identification Process



4.0 Forest Road

4.1 General Road Construction Guidelines

- Forest access roads will be constructed on stable soil types and located away from major waterbodies and/or watercourses, where possible, to minimize potential effects on aquatic habitats. Forest areas known to support unique or critical habitats and/ or sensitive cultural heritage sites will be avoided entirely.
- To reduce the number of cut and fill operations, forest roads will be constructed on natural benches, moderate slopes and ridges in order to minimize forest disturbance, where possible.
- When constructed, forest road ditches will be directed into adjacent forest vegetation, in order to minimize the potential for sediment to be transported directly into the watercourse. The forest vegetation will help filter any sediment carried by surface runoff before the water enters the stream channel. Exposed soil material in road ditches must be stabilized using surface roughening techniques and/or seeding. These methods will prevent the potential for erosion to occur through time.
- All debris accumulated through road clearing and construction operations is to be stored away from any watercourse or waterbody to prevent the material from potentially entering these areas.

4.2 Forest Road Construction Standards

Table 1 shows minimum construction standards for all classes of roads. Attributes that vary between classes, but are applicable to all include safe design speed, width of right-of-way, ditches, culverts, bridges, road use, and term of life. The table also shows road construction planning and practices, retirement proposals, and access control and closures. If existing roads are upgraded or abandoned roads are reused, the road must be meet the appropriate standards for the class of road it is to be upgraded to.

4.3 Forest Road Development Operations

Guidelines for clearing, construction and re-vegetation are presented in Table 1 - Road Construction Guidelines.

4.3.1 Clearing

The width of road right-of-ways (ROW) will be determined by LPC's road construction and maintenance needs and by site specific environmental considerations consistent with Table 1. The following factors will influence ROW clearing widths:

- Visual screening for wildlife and aesthetics.
- Need for road grade drying.
- Unstable and difficult terrain for construction.

- Safety concerns.

The organic horizon and herbaceous vegetation will be maintained on the approaches adjacent to the watercourse crossings, where possible. Top soil will be piled apart from logging debris and used for road and bared landing reclamation, where feasible.

Road and trail construction within 100m of the high-water mark of any permanent stream, and 30m of an intermittent stream or natural spring will be avoided. In situations where construction can not be avoided, careful planning is required in order to minimize the potential for erosion and sedimentation from occurring.

Associated road construction activities such as borrow pits, landings, camp and storage sites in buffer zones will be avoided.

4.3.2 Road Construction

Road backslopes will have a regular profile from the top of the cut to the bottom of the ditch with no hanging banks or sharp cut ditches. Ditches will be constructed to the same grade as the road and be sufficiently deep to drain the subgrade unless limited by topography.

LPC will keep the number of borrow pits and gravel pits developed for road construction and maintenance to a minimum. The use of existing pits will be a priority. All gravel pits will require the appropriate permits from the Province of Manitoba, as well as Manitoba Energy and Mines (MEM). Consideration will be given to maximizing habitat potential of borrow pits during rehabilitation. Gravel pits will not be located near groundwater source areas, care will be taken to avoid contaminant spills in gravel pits.

Run-off ditches and other erosion control devices will be installed during road construction and maintained to:

- Minimize water movement and erosion along ditches, on the road surface and on cut-and-fill slopes.
- Direct water from the RoW into the surrounding vegetation in as short a distance as possible.
- Provide drainage as required, for water from springs or other seepage areas.
- Avoid direct ditch drainage into watercourses.

Final erosion control measures will take place after road construction. This may include re-vegetation, seeding, establishment of silt fence, and removal of unstable fill material.

Site disturbance will be minimized during road construction to reduce the extent of reclamation required during road abandonment.

4.3.3 Road Maintenance

Class I-IV roads will be maintained in order to facilitate the safe transport of raw wood products to existing road systems (municipal and provincial roads). These environmental and operational considerations will be followed:

- All season roads to have a crowned surface to provide adequate drainage and to prevent road erosion
- Runoff ditches to be kept open at all times
- Ensure road material does not enter any watercourse while grading; minimize the removal of gravel from road surface.
- Careful practices will be applied when grading on or near water crossing structures.

During active logging operations, monitoring of road conditions and water crossings occurs on a continual basis.

4.3.4 Road Abandonment

The regulation of the use of existing access is a significant concern in natural resource management, particularly for the protection of wildlife and wildlife habitat. Wildlife can be affected from access development through increased hunting pressure, and decreased habitat use on or adjacent to access corridors due to increased vulnerability to predation and vehicular collisions. For some species, major transportation corridors or wide rights-of-way (RoW) can also act as deterrents or barriers to movements.

As the relative significance of such effects depends on the behavior of an individual species, access closures are often focused on key species. Some species may be regionally significant and sensitive to disturbance or may exhibit highly localized habitat use both temporally and spatially. Therefore, physical means to close or minimize access to protect wildlife and wildlife habitat can vary in nature and timing of use.

Access controls may also be implemented where resource road deterioration such as rutting results from uncontrolled public use, particularly during wet conditions or spring breakup. They have also been used as a means of controlling chronic erosion and run-off problems on RoWs, where surface disturbance from off-road traffic prevents a stabilizing mat of vegetation from developing on steeper slopes. Such measures are of particular importance in the vicinity of water crossings, where sediment laden run-off can be introduced from RoWs into watercourses to the detriment of aquatic habitats.

4.3.4.1 Permanent Road Abandonment

Upon permanent abandonment or closure of roads, areas that may have been affected by road construction will be returned as close to their original state as possible. Abandonment may include:

- Removal of watercourse and drainage structures;

- Re-contouring to an acceptable land form;
- Cross-ditching to disperse runoff and suspended sediments into vegetated areas;
- Rollback of retained clearing debris and stripped topsoil;
- Re-vegetation or reforestation or both;
- Following winter operations, windrowed grader banks of snow may be pushed back at identified locations to prevent spring runoff from forming channels/gullies in roadbed.

Consideration will be given to the following when deciding whether all-terrain vehicle (ATV) access into an area should remain:

- Silviculture treatments that may be required.
- Any further requirements for research, development or monitoring.
- Wildlife concerns.
- Recreation opportunities.
- Fire control and management.
- Erosion control.
- Trapline access and other public or commercial uses.

4.3.4.2 Temporary Road Abandonment

Temporarily abandoning roads required for access to subsequent-pass harvest blocks will restrict four-wheel-drive access. This may include, but is not restricted to:

- Barricade placement and impediments with appropriate signage for the access restriction;
- Removal of watercourse crossings and drainage structures and backsloping of approaches; and
- Stabilization of all un-vegetated slopes with rollback (pulling debris such as logs and stumps back onto road), seeding to approved reclamation species and cross-ditching to disperse runoff and suspended sediment into undisturbed areas.

5.0 Standard Operating Guidelines for Water Crossings

5.1 General Guidelines

The following specific guidelines are to be used in the construction of water crossings within FML 3 and outside LPC operations.

- The crossing location should be free of downed woody material and be positioned at the narrowest point along the straight segment of the reach.
- The crossing location must be positioned at right angles to the watercourse and where there is enough area to construct gentle, direct and stable road approaches.

- Water crossings must provide uninhibited access for fish migration to both upstream and downstream habitats year round.
- In areas known to support or potentially support fish, portable bridges, snow and ice crossings or open bottom culverts are preferred.
- The removal of riparian vegetation along proposed crossing locations must be kept to a minimum on newly constructed forest roads.

All watercourse crossings will be installed with the objective of maintaining water quality and the stream environment.

Where construction equipment must cross a watercourse before or during the installation of a crossing, they will do so at only one location to minimize the number of crossings needed, ensuring no impact on fish habitat. In most cases pipe bundles will be used for the passage of equipment over these areas.

Logging debris, soil or any other deleterious material will not be deposited into, or pushed through, any watercourse, or onto the ice of any watercourse.

Work associated with the installation of culverts and bridges will be timed to avoid fish migration, spawning and incubation periods.

All watercourse crossings will conform to the Manitoba Stream Crossing Guidelines for the Protection of Fish and Fish Habitat, and Recommended Procedures for Protecting Fish Habitat in Lakes and Streams in Forest Cutting Areas.

5.2 Culvert Crossings

Culvert crossings are typically installed during dry conditions in the spring, summer and autumn months. In some cases, small PVC culverts may be used to assist continuous flow during winter months within a winter snow and ice crossing. The following are general procedures and considerations for culvert installations:

- Culvert crossings will be designed to support between a Q2 and a Q100 flood event based on the lifespan of the crossing.
- Culvert installations will be planned for periods of low flow; if watercourse is flowing, flow will be blocked temporarily to enable dry installation.
- Large boulders or rocks will be removed from streambed in order to prevent culvert damage.
- While maintaining the original slope of the watercourse, the culvert will be embedded approximately 10% of its diameter.
- Geotextile may be laid underneath culvert if suitable base material is not present.
- Suitable backfill material is then placed around culvert and compacted to ensure culvert stability.

- The inlets and outlets may be rip rapped or re-vegetated if conditions warrant (slope, flow, channel width etc.).

5.3 Bridge Crossings

Bridge crossings often prescribed are engineered portable structures that can be installed with relative ease. Typical construction considerations for forest road bridges are described as follows:

- Bridge footings will be constructed out of stabile material to prevent sedimentation. Logs, timbers and soil wrapped in geotextile are some examples of appropriate footings.
- Wing walls will be constructed on all bridge installations and will remain in place during unfrozen conditions (spring, summer, and fall).
- Disturbance to the existing streamside vegetation will be minimized during construction. This will ensure natural re-vegetation after decommissioning as well as stabilization while the structure is active.

5.4 Snow and Ice Crossings

Temporary snow and ice crossings are common structures constructed during winter operations. The following guidelines/considerations are implemented during the construction of snow and ice crossings:

- Construction of snow and ice crossings occurs during freezing temperatures for water.
- Snow that is being pushed into watercourse must be free from dirt and or logging debris.
- Clean snow may be hauled in from an outside location if not present on site.
- Water may be pumped onto snow to strengthen and stabilize crossing.
- During deactivation a trench is constructed in order to allow for unobstructed flow during the spring melt.

5.5 Water Crossing Deactivation

Once harvesting is complete and the forest road is to be deactivated, all water crossings along the road may be removed. The following deactivation activities vary by site and include one or more of the following procedures:

- The establishment of sediment control fences on land and instream where required;
- Removing the structure (culvert or bridge);
- Removal and sloping of fill used to construct crossing;
- Sloping the roadbed away from the watercourse;
- Track walking the slopes;
- Installation of cross ditches to divert runoff from roadbed into standing vegetation;

- Stabilization of the exposed soil by spreading grass seed and covering with either Rolled Erosion Control Products (RECP), straw mulch or slash debris from harvesting and road construction activities;
- Permanent (long term) decommissioning can also involve the planting of trees and shrubs, as well as other bioengineering techniques;
- Snow and Ice crossings are decommissioned by digging a shallow trench in the ice to prevent spring runoff from backing up and scouring the banks on flowing streams. On swales the snow and ice is allowed to melt;
- Once the work is completed, the site is then monitored on a semi-annual basis to ensure that the soil stabilization techniques applied are working effectively.

APPENDICES

Appendix 1.1 LP Canada Ltd. Road Construction Standards

Road Description		Environmental Protection Guidelines								
		Detailed Plan Preparation	Field Layout	Design and Construction Guidelines						
				Right-of-Way (max. distances- normal conditions)			Alignment			
Road Class	term of Life			Clearing Width	Road Surface	Drainage Ditch	Sight distance	Slope of road/ditch see note 2	Design Speed	Borrow Pits
I	Permanent Year-round access for 20+ years	Detailed design plan on AOP maps. . Types of structures for water crossings, erosion control measures, and rehabilitation plans required.	Centreline marked.	45m or less	8.5m As specified in AOP	Rounded or scraper	Less than 1km	2:1	90km per hr	Location identified before construction commences and site tested for materials and ground water levels before clearing of borrow area. Dog-legged access or access constructed at an angle with buffer to off right-of-way should be incorporated by variable width and recontouring. Use of small borrow pits incorporated into right-of-way where possible
II	Permanent year-round access for up to 20 years	See Class I	See Class I	30m	As specified in AOP	Rounded or scraper	Less than 1km	2:1	80km per hr	See Class I
III	Permanent dry or frozen periods for 2-20 years	See Class I	See Class I	20m	As specified in AOP	Rounded or scraper	Less than 1km	2:1	60km per hr	See Class IV permanent
IV	Permanent year-round or seasonal access for more than 5 years	See Class I	Centreline marked.	10-20m	As specified in AOP	Rounded	Less than 1km	2:1	40km perhr	Use of small borrow pits incorporated into right-of-way where possible.
IV	Temporary dry or frozen periods for up to 2 years	See Class I	See Class IV permanent	10-20m	As specified in AOP	Rounded	Less than 1km	2:1	40km per hr	See Class IV permanent
V & VI	Temporary frozen periods only up to 2 years	See Class I	See Class IV permanent	8-20m	As specified in AOP	Rounded, if any required	Less than 1km			See Class IV permanent

1. Minimum allowable following distances on all road classes is 200 m. Bypasses or turnouts on haul road classes III, IV, V, and VI every 5 kms to allow vehicles to pass safely, where road width is insufficient to allow safe passing.
2. On normal soils, back and fill slopes may vary from the standards specified for temporary class IV and V roads, within reasonable limits.

Appendix 1 cont.

Environmental Protection Guidelines							
Design and Construction Guidelines							
		Water crossings				Decommissioning	
Timber Salvage	Debris Disposal	Bridges	Culverts	Erosion control & Revegetation	Maintenance	Temporary	Permanent
Salvage will be done according to timber management regulations.	Total disposal except strippings and fine debris (10cm or less) to be retained for erosion control by spreading on cuts and fills and any other critical areas. Can be piled along right-of-ways but not into standing timber, unless road is longer term, at which time it is ramped into piles outside the ROW.	Bridges may be required where biological, hydraulic and/or terrain characteristics are significant. Should be designed to facilitate other resource users.	All culverts designed for Q100 flood event. Culverts placed in fish bearing streams must facilitate fish passage.	Progressive reclamation (recontouring cuts and fills and revegetation) concurrent with construction. Seed mixtures to be appliedwhere necessary. Cross drains and ditch blocks dictated by slopes and soil conditions. Drainage water to be diverted off the r-o-w in as short a distance as possible.	Annual maintenance required	Removal of all crossing structures, additional erosion measures implemented and active maintenance required.	Complete removal of all crossing structures and engineering aspects of the road. Recontouring of road to original state and seeding of right-of-way.
See Class I	See Class I	See Class I	See Class I	See Class I	See Class I	See Class I	See Class I
See Class I	See Class I	See Class I	See Class I	See Class I	See Class I	See Class I	See Class I
See Class I	Partial disposal. May be spread on road bed on closure.	Portable bridges are preferred. Properly constructed ice bridges on intermittent streams. Temporary crossings must be removed before spring breakup.	See Class I	seeding may be required	As required	See Class I	See Class I
See Class I	See Class IV permanent	See Class IV Permanent	See Class I	See Class IV permanent	As required	See Class I	See Class I
See Class I	See Class IV permanent	See Class IV permanent	See Class I	See Class IV permanent	As required	See Class I	See Class I