

YUKON FOREST RESOURCES ACT Soil Conservation Standards and Guidelines

REGULATORY REFERENCE

Forest Resources Regulation

PART 2 – PLANNING

DIVISION 4 – SITE PLANS

Contents of a Site Plan

22. A site plan must include, in respect of the area to which it applies:

(f) a description of the protective measures that will be used in relation to both timber harvesting and road construction and use (i) to conserve soil productivity and hydrological functions.

ACKNOWLEDGEMENTS

This standard/guideline was compiled from BC Ministry of Forests resources, plus the Yukon Timber Harvesting Procedures and Operating Guidelines (THPOG).. Manuals, reports and publications used to prepare this standard are referenced.

OBJECTIVE

To ensure that there are protective measures used in relation to timber harvesting and road construction to conserve soil productivity and the hydrological function of soils.

STANDARDS

- 1. The Site Plan must set out the maximum percentage of the area in permanent access structures (i.e.: roads and landings).**
 - The area occupied by permanent access structures (roads/landings) must not exceed the area prescribed in the site plan, which should not exceed **5%** of the gross block area. The percentage should be calculated as per Guideline #2.
- 2. The Site Plan must set out the maximum percentage of soil disturbance within the net area to be reforested (NAR).**
 - Soil disturbance (including temporary access structures and the soil disturbance described in Appendix B) must not exceed 5% of the net area to be reforested (NAR), unless there is a rationale which considers how soil conservation measures will be achieved.
- 3. Soils with a high hazard rating (see Appendix A) will be scheduled for winter/frozen harvest unless the site plan clearly states mitigation factors such as the type of logging equipment being used, harvest history and logging plan proposed by the operator shows that the risks can be managed.**
- 4. Areas with soils that have a very high hazard rating must be scheduled for winter/frozen harvesting only.**

GUIDELINES

1. Where harvesting is planned, site and soil data shall be collected to determine the sensitivity to soil disturbance. Use the hazard keys in Appendix A to determine the soil compaction, soil erosion and soil displacement hazards and record in the Site Plan.
2. **Permanent access structures** should be kept to a minimum. The maximum allowable soil disturbance associated with permanent access structures (refer to definition) shall be calculated and stated in the Site Plan.
Example: (% Disturbance = (length x width of all permanent roads/landings)/gross area x 100%).
Note: the road area is calculated by multiplying the full width of the road, from the outside edge of each ditch on each side of the road times the length.
3. Minimize the area of temporary and permanent roads and landings.
4. Avoid permafrost areas whenever possible.
5. Avoid operating on slopes greater than 30% with ground based systems.
6. Mechanical site preparation should only be conducted if the compaction hazard is moderate or less, or when soil conditions and/or the use of specialized equipment will reduce their susceptibility to rutting, compaction and erosion.

DEFINITIONS

Gross Block Area is the total area planned for harvesting. This area is often the same as the cutting permit or the site plan area. This area includes all internal roads, landings and any internal reserves or non-productive areas.

Net Area to Reforest (NAR) is gross block area minus all permanent access structures, reserves, non-productive areas and non-forest areas.

Permanent Access Structures includes main haul roads, spur roads, landings, gravel pits, permanent logging trails which are planned to be used for a long enough period that, if they were rehabilitated, a commercial crop of trees could not be established within the same time frame as the remainder of the unit. Permanent access structures are not part of the NAR (net area to be reforested) and do not count towards soil disturbance.

Temporary Access Structures includes roads, landings, skid trails that are identified as temporary in the site plan and which meet the criteria of soil disturbance.

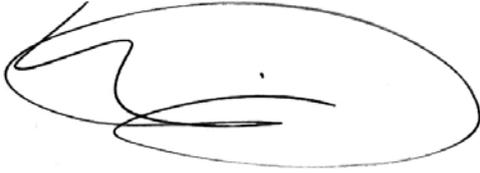
Sensitive soils/site (see Appendix A) means soils that, because of their slope gradient, texture class, moisture regime, or organic matter content have a very high hazard risk of displacement, surface erosion or compaction based on *Forest Practices of BC Hazard Assessment Keys for Evaluating Site Sensitivity to Soil Degrading Processes Guidebook, Second Edition, Version 2.1, March 1999*. (Refer to Appendix A for a summary). Note: only one of the soil hazard keys needs to be very high to rate the entire unit as very high.

Soil Disturbance (Appendix B) is a general term referring to different types of disturbance described in appendix B that may occur within the NAR.

Winter/Frozen Ground refers to the period of year during which the ground is sufficiently frozen to support a vehicle without rutting, compacting or gouging of the surface.

Approved by:

Date:



July 3rd, 2012

Lyle Dinn
Director
Forest Management branch

Appendix A

EVALUATING SITE SENSITIVITY TO SOIL DEGRADING PROCESSES:

The following is a brief outline of the Hazard Keys used to determine soil/site sensitivity taken directly from the *Forest Practices of BC Hazard Assessment Keys for Evaluating Site Sensitivity to Soil Degrading Processes Guidebook, Second Edition, Version 2.1, March 1999*:

Soil Compaction is the increase in soil bulk density that results from the rearrangement of soil particles in response to applied external forces.

Soil Puddling is the destruction of soil structure and the associated loss of macroporosity that results from working the soil when wet.

Soil compaction and puddling hazard key

Soil texture ² (0-30 cm)		Hazard rating ^b moisture regime	
		Xeric-sub-hygric ^c Dry – very moist ^c (H horizons <20 cm)	Subhygric ^d – subhydric Wet – very wet ^d (H horizons ≥20 cm)
Fragmental (coarse fragments >70%)		L	M
Coarse fragments (<70%)	Sandy S, LS	L	VH ^e
	Sandy loam SL, fSL	M	
	Silty/loamy SiL, Si, L	H	
	Clayey SCL, CL, SiCL, SC, SiC, C	VH	

^aSoil texture abbreviations: S – sand; LS – loamy sand; CL – clay loam,; SL – sandy loam; fSL – fine sandy loam*; C – clay; L- loam; Si – silt; SiC – silty clay; SiL; silt loam; SC – sandy clay; SCL = sandy clay loam; SiCL – silty clay loam

* For the purposes of this key, fSL “fine sandy loam” means the soil contains 30% or more fine or very fine sand, or more than 40% fine and very fine sand combined. Fine sand is 0.25-0.10 mm in diameter, very fine sand is 0.10-0.05 mm in diameter. These generally represent the limits of visible particles.

^b L – Low; M – Moderate; H – High; VH – Very high

^c Use this column for wet (subhygric) sites with forest floor horizons <20 cm thick.

^d Use this column for wet (subhygric) sites with forest floor horizons ≥20 cm thick.

^e Organic soils composed of >40 cm of wet organic material, or forest floors >40 cm (including Folisols <40 cm), are susceptible to rutting because their very low load-bearing strength materials make them easy to displace. The very low load bearing strength of these materials means that they have a high soil displacement hazard and a very high compaction and puddling hazard.

Soil displacement hazard key

Soil displacement is the mechanical movement of soil materials by equipment and logs. It involves excavation, scalping, exposure of underlying material and the burial of surface soils.

*Slope gradient**

Slope gradient (%)	Points	Slope gradient (%)	Points
0	0	40	6
5	1	45	8
10	1	50	10
15	2	55	12
20	3	60	16
25	3	65	20
30	4	70	26
35	5	75	32

Slope complexity

Terrain feature	Slope gradient (%)	Points
Close gully spacing: (two or more >2 m deep, sharp-edged Gullies occur per 100 m along the contour)	<30%	2
	30-45%	4
	>45%	6
Hummocky terrain: (broken terrain with small, but steep-sided knolls or ridges, {e.g., eskers, rocky knobs and drumlins})		2

Subsoil conditions

Depth should be measured from the bottom of the forest floor to the unfavourable subsoil, bedrock, seepage, carbonates or permafrost (points)	<30 cm	30-60 cm	61-90 cm	>90 cm
	12	8	4	0

Soil displacement hazard ratings (point total)			
Low <7	Moderate 7-14	High 15-24	Very High >24

Organic Soil

Organic soils composed of ≥40 cm of wet, organic materials:	High
Forest floors over bedrock or skeletal materials (e.g. Folisols):	Very high

*Use average slope to determine rating, but also consider the upper end of the slope range in formulating prescriptions.

Soil erosion hazard key

Soil erosion is the wearing away of the earth's surface by water and wind. It includes splash, rill and gully erosion. "Accelerated erosion" is that which is caused by human activities, and that results in more than just geological erosion.

Site factors	Degree of contribution of factors			
	Low	Moderate	High	Very High
Climate* Precipitation factor (points)	low 2	moderate 4	high 6	very high 8
Topography Slope gradient (%) (points)	0-10 1	11-20 3	21-50 6	50 9
Length/uniformity (points)	Short broken 1	Short uniform 2	Long broken 3	Long uniform 4
Depth to water-restricting layer (cm) (points)	>90 1	61-90 2	30-60 3	<30 4
Surface soil detachability (0-15 cm) (points) ^a	SC,C,SiC 1	SiCL,CL,SCL 2	SL,L 4	Si, SiL,fSL,LS,S 8
Surface course fragments (0-15 cm) ^b (points)	>60 1	31-60 2	16-30 3	<16 4
Subsoil permeability (16-60 cm) ^a texture (points)	S,LS,SL,fSL 1	L,SiL,Si 2	CL,SCL,SiCL 3	C,SC,SiC 4
Soil erosion hazard rating ^b (point total)	Low <16	Moderate 16-22	High 23-31	Very High >31

^a If two contrasting textures or coarse fragment contents occur in the depth, use the one with the highest point rating.

^b Gently sloping areas with long, uniform slopes may rate as high soil erosion hazard. The reason is that substantial erosion can occur on these sites given the right conditions.

* NOTE: In Yukon the climate-precipitation factor is either "low or moderate." The majority of tYukon should be classified as "low," with the exception of the Watson Lake area – which is "moderate."

Appendix B

SOIL DISTURBANCE:

The following is a brief summary of what is classified as soil disturbance (within the NAR), depending on the site/soil sensitivities, taken directly from the *Soil Conservation Surveys Guidebook, 2nd Edition, May 2001, Forest Practices Code of BC* (refer to this document for further explanation).

Measuring soil disturbance begins with a visual inspection. Where disturbance appears to exceed the limits set in the site plan, a transect survey may be required to determine the percentage of the area occupied by soil disturbance. If this is necessary, it should follow the procedures identified in the Soils Conservation Guidebook.

Always Counted

Deep Gouge



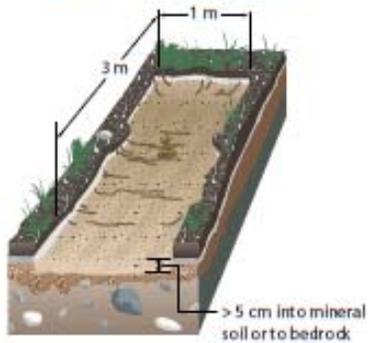
Wide Gouge

(80% of 1.8 m x 1.8 m)



Long Gouge

(100% of 1.0 m x 3.0 m)



Very Wide Scalp*

(80% of 3.0 m x 3.0 m)

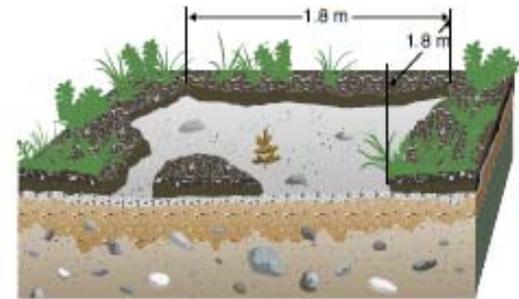


* Scalp means the forest floor has been removed.

Wide Scalp*

(80% of 1.8 m x 1.8 m)

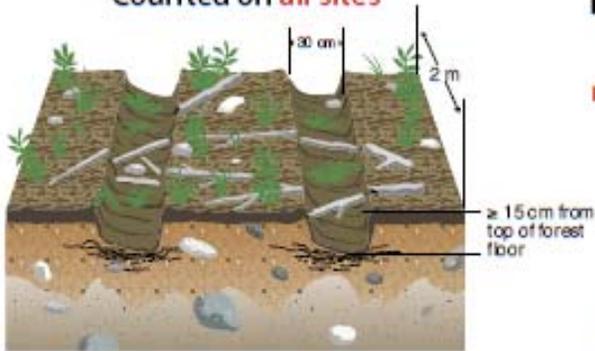
Counted when VH soil displacement, compaction or erosion; or M or H likelihood of landslides.



Forest Practices Branch
B.C. Ministry of Forests
 Soil Disturbance Card June/05

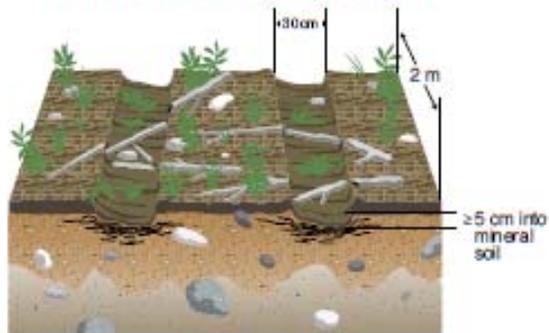
Wheel/Track Rut

Counted on **all sites**



Wheel/Track Rut

Counted on **very high and high compaction hazard sites**



Repeated Machine Traffic

Counted on **very high, high and moderate compaction hazard sites**



Compacted Areas:

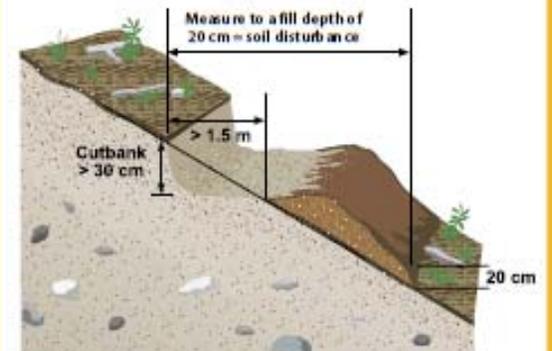
Counted on same sites as "repeated machine traffic," but compacted areas are larger (i.e., must be $>100\text{ m}^2$ and $>5\text{ m}$ wide).

Corduoyed Trail:

Logs and woody debris placed side-by-side to form a surface $>2\text{ m}$ long capable of supporting machine traffic.

Temporary Excavated/Bladed Trails

Unfavorable Fill Slope Material (won't support tree growth)



Favorable Fill Slope Material

