

Blackwell, Jason FLNR:EX

From: Stephane Dube <soils@me.com>
Sent: Thursday, October 23, 2014 9:58 AM
To: Carson, Shannon B FLNR:EX
Cc: Blackwell, Jason FLNR:EX
Subject: Re: FOI request
Attachments: Burns Lake - Block 18.xlsx

Hello. Here is the spreadsheet for bulk density data. I believe the (1) field card (just volume calculations for each sampling point) can be found in the file folder I left in the box. I am 100% certain THAT I did not comment on compaction ie. wrote down notes during sampling.

Jason, please let me know if you need anything else.

On Oct 22, 2014, at 10:12 AM, "Carson, Shannon B FLNR:EX" <Shannon.Carson@gov.bc.ca> wrote:

Jason Blackwell is coming into PG on Friday to try to find the requested information. Can you tell me if the requested info is in the file folder you put in my office, on the LAN, in your office or in another location? Thanks, for any assistance.

Shannon Carson

Research and Stewardship Team Leader

Ministry of Forests, Lands, and Natural Resource Operations

1044 5th Avenue

Prince George, BC V2L 5G4

Phone: 250-565-6214

shannon.carson@gov.bc.ca

Burns Lake - Block 18

Sample	Disturbed/ Undisturbed	Volume	Collected	Tray Wt (g)	Tray + Sample Wt (g) Wet	Sample Wt (g) Wet	Tray + Sample Wt (g) Dry	Sample Wt (g) Dry	Time In	Time Out	Db	Average
35N		2460	2012									
35		2200	2012									
84	Disturbed	3570	2013	108	9640	9532	7496	7388	Nov 26, 2013 19:23	Nov 27, 2013 19:23	2.06946779	1.61283226
N-1		3290	2012									
N-1	Undisturbed	4230	2013	132	8224	8092	6186	6054	Nov 26, 2013 19:23	Nov 27, 2013 19:23	1.43120567	0.98838606
N-2		4490	2012									
N-2	Undisturbed	3860	2013	48	5342	5294	3712	3664	Nov 26, 2013 19:23	Nov 27, 2013 19:23	0.9492228	
N-3	Undisturbed	4570	2013	110	7994	7884	6230	6120	Nov 26, 2013 19:23	Nov 27, 2013 19:23	1.33916849	
N-4	Undisturbed	4680	2013	2250	8600	6350	6666	4416	Nov 25, 2013 18:43	Nov 26, 2013 19:17	0.94358974	
N-5	Undisturbed	4320	2013	1112	7916	6804	6586	5474	Nov 25, 2013 18:43	Nov 26, 2013 19:17	1.26712963	
75		2820	2012									
75	Disturbed	3300	2013	108	7816	7708	6130	6022	Nov 25, 2013 18:43	Nov 26, 2013 19:17	1.82484848	
6	Disturbed	3260	2013	2250	8744	6494	7798	5548	Nov 25, 2013 18:43	Nov 26, 2013 19:17	1.70184049	
78	Disturbed	3340	2013	1100	7034	5934	5290	4190	Nov 26, 2013 19:23	Nov 27, 2013 19:23	1.25449102	
24	Disturbed	3700	2013	106	6854	6748	4596	4490	Nov 25, 2013 18:43	Nov 26, 2013 19:17	1.21351351	
24		2900	2012									

Note: 2013 samples collected on Oct 3, 2013. Weather was sunny and cool.

Blackwell, Jason FLNR:EX

From: Dube, Stephane FLNR:EX
Sent: Friday, July 5, 2013 10:40 AM
To: Blackwell, Jason FLNR:EX
Subject: RE: A72921 Cp 008 Blk18

Sure. I can do this. Keep posted.

By the way, my new assistant has started this week. We're making plans now...

Stephane
Soil Scientist
BC Forest Service

From: Blackwell, Jason FLNR:EX
Sent: 2013-07-02 14:41
To: Dube, Stephane FLNR:EX
Cc: Brochez, Pat E FLNR:EX
Subject: RE: A72921 Cp 008 Blk18

Stephane

Just wondering what your ETA is on this site. If you're not going to have time, could you send a list of the additional waypoints that would need to be measured, and Pat and I could do it.

Thanks

Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279

From: Dube, Stephane FLNR:EX
Sent: Friday, May 31, 2013 1:35 PM
To: Blackwell, Jason FLNR:EX
Cc: Brochez, Pat E FLNR:EX
Subject: RE: A72921 Cp 008 Blk18

Hi Jason. I plan to go along with my assistant, who will be available around mid-June. You are welcome to join us. I will let you know shortly. It will be in sometime in June.

Thanks.

"The best thing about the future is that it comes one day at a time"; Abraham Lincoln

Stephane
Soil Scientist
BC Forest Service

From: Jason.Blackwell@gov.bc.ca
Sent: 2013-05-16 3:05 PM
To: Stephane.Dube@gov.bc.ca
Cc: Brochez, Pat E FLNR:EX
Subject: A72921 Cp 008 Blk18

Stephane

I was out to check the site today, and it is snow free, in another couple weeks any standing water should be dried up. I will make myself available whenever it fits your schedule. It would be nice though to get this site completed before the busy field season.

thanks

Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279

Blackwell, Jason FLNR:EX

From: Dube, Stephane FLNR:EX
Sent: Monday, August 19, 2013 8:10 AM
To: Blackwell, Jason FLNR:EX
Cc: Brochez, Pat E FLNR:EX
Subject: Road Side Work Area - more points
Attachments: RWA 60 pts.kml

Hi. I forgot about this...My apologies.

Find attached 60 additional points within RWA in kml format.

I plan to go and collect soil samples this week or in early September.

Thanks.

"A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people. " — Franklin D. Roosevelt

Stéphane Dubé, M.Sc., RPF
Soil Scientist
BC Forest Services - Omineca
1044 5th Ave, 5th floor
Prince George, BC
V2L 5G4
Phone: (250) 565-4363

Blackwell, Jason FLNR:EX

From: Stephane Dube .s.22
Sent: Thursday, December 12, 2013 11:23 AM
To: Brochez, Pat E FLNR:EX; Blackwell, Jason FLNR:EX
Cc: Spencer, Daryl FPB:EX
Subject: C&E report A72921 CP008 CB18
Attachments: C&E report A72921 CP008 CB18.pdf; ATT00001.txt

Better late than never...My apologies.

Let me know if you have any questions. Thanks.

Background

In late spring 2012, Jason Blackwell and Pat Brochez of C&E - Nadina Field Unit and I carried out a visual inspection to confirm that the maximum disturbance limits in the Forest Stewardship Plan (FSP) had not been exceeded on cutblock No. A72921 CP0088 CB18 near Maxan Creek. It was apparent that logging may not be in compliance. Logging operations caused excessive soil disturbance such as ruts, compaction and stripping of the forest floor throughout the cutblock. Consequently, a formal soil conservation survey was conducted together to determine the percentage of the area occupied by soil disturbance between late summer 2012 and early spring 2013.

A conservation survey using the random point sampling method as described in Chapman *et al.* (2013) found 2 instances of non-compliance with the objectives specified for soils in 0639881 B.C. LTD Forest Stewardship Plan (FSP, **Appendix A**, sec. 3.2 - Objectives for soils):

- 1) The intended results for soils within the Net Area to be Reforested (NAR) and Roadside Work Areas (RWA's) set out in the FSP in accordance with sec. 35 & 36 of the *Forest and Range Practices Act of BC* were not achieved by the agreement holders.

Results and Discussion

Silty Loam (SiL) was the dominant soil type, as determined by the “Hand Test” in the upper 30 cm of soil during the survey. The coarse fragment content by volume was visually estimated between 15-25% with a diameter size <7.5 cm (gravel size). When squeezed in your fist, moist SiL will form a ball; when wet, it does hold moisture well but crumbles easily under heavy equipment. Therefore, this site has a high compaction and puddling hazard which reflects the inherent compactibility of the soil when a stress is applied. In fact, silt-type soil has very little load bearing capacity and is highly susceptible to compaction when wet.

A soil conservation survey based on random point sampling provided statistically valid measurements of the percentage of the area occupied by soil disturbance. As per the *Forest Planning and Practices Regulation – Part 1 Interpretation*, soil disturbance includes temporary access structures, gouges, ruts, scalps and compacted areas. Survey points were generated randomly in ArcMap (Esri GIS software) and placed onto the GPS soil survey map (**Figure 1**) created with OziExplorer (D&L Software Pty Ltd. mapping software).

Dispersed soil disturbance was assessed using the classification criteria outlined in the Forest and Range Evaluation Program Protocol for Soil Resource Stewardship Monitoring: Cutblock Level (Curran *et al.*, 2009). These criteria are the same as defined in the Soil Conservation Surveys Guidebook (BC Forest Service, 2001). Survey points or waypoints were located in the field using both a GETAC Tablet PC with built-in GPS and Garmin handheld GPS, and followed the survey procedure outlined in Chapman *et al.* (2013).

The survey did confirm the large extent to which the block area was in non-compliance with the allowable limits, respectively 10% in the NAR and 25% for RWA's set under the 0639881 B.C. LTD FSP. Estimated mean disturbance levels exceeded the critical values using a one-sided t test at 90% confidence level (**Table 1**). Within the NAR (**Figures 2 & 3**), based on 76 random sample points survey results showed an estimated 34.2% disturbance level (**Table 1**). As illustrated in **Figure 4**, logging produced 67.5% of the area within RWA's with soil disturbance, which was almost three times over the limit (n=80).

Table 1. Maximum soil disturbances limits in Forest Stewardship Plan (FSP) and estimated mean and critical values for soil disturbance from the random point sampling survey for both NAR (n=76 pts) and RWA's (n=80 pts).

Areas	Soil limits in FSP %	Estimated mean soil disturbance % (<i>critical test value</i>)
NAR	10	34.2 (27.1)
RWA's	25	67.5 (60.7)



Figure 1. Aerial Photography of block A72921 CP008 CB18 taken in 2012 (1 year post logging, 15 cm pixel size resolution). GPS soil survey map showing random sampling points (or GPS waypoints with Latitude and Longitude coordinates) with yellow symbol in NAR (grey perimeter) and RWA's (blue perimeter).



Figure 2. GPS soil survey map (north end): Waypoints are identified as non-counted disturbance (**yellow**), counted disturbance (**red**) or point landing outside of NAR (**grey**).

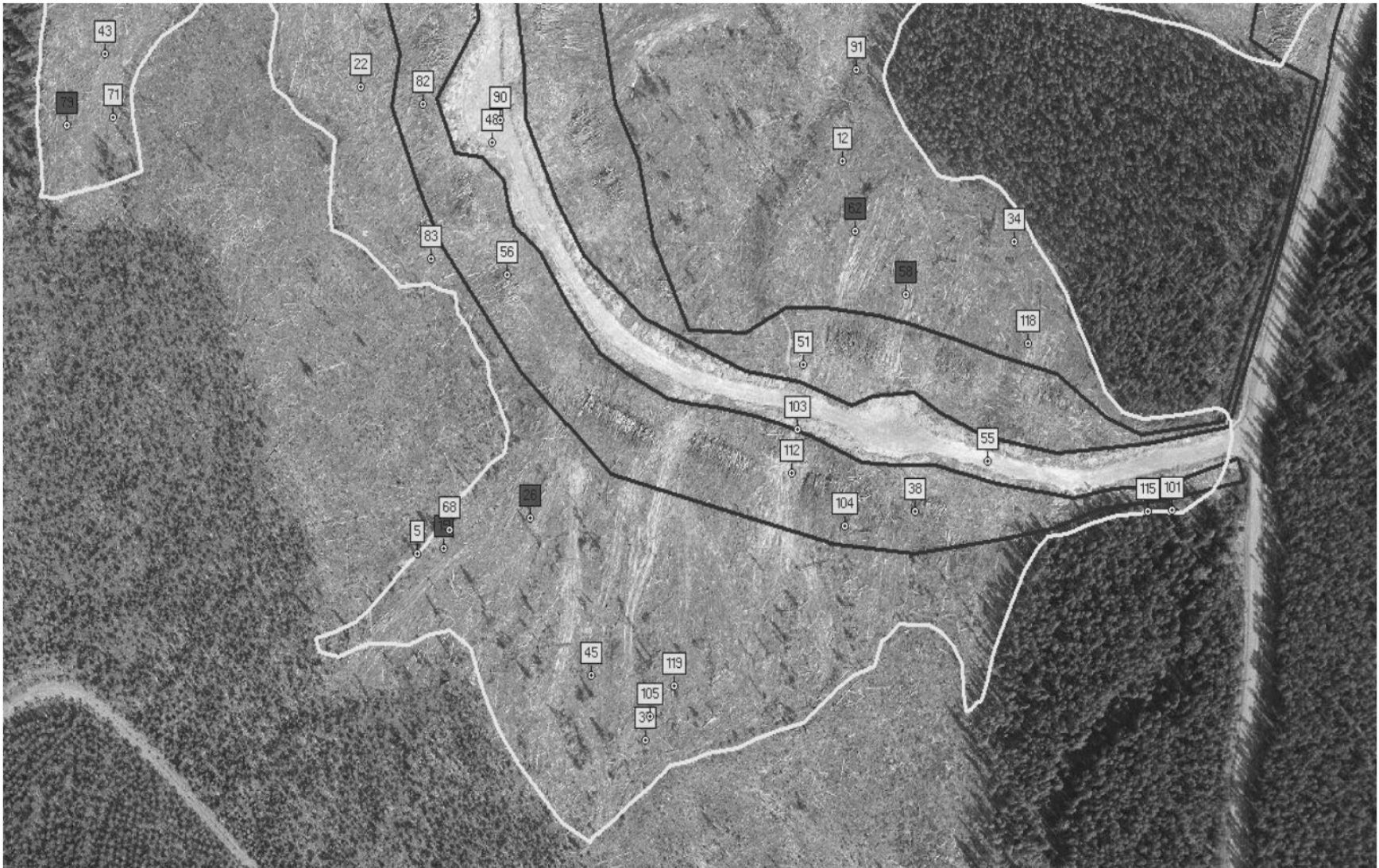


Figure 3. GPS soil survey map (south end): Waypoints are identified as non-counted disturbance (**yellow**), counted disturbance (**red**) or point landing outside of NAR (**grey**).NOTE: Real-time positioning can lead to location discrepancy between the map and ground survey (e.g., point 112), however navigation to a waypoint is still random.

Repeated Machine Traffic was the most common disturbance type across the site (see light-coloured white skid trails on photos). Compacted soils amounted to 60% of the entire disturbance. Repeated machine traffic (code "E") is called when the survey point and sampling window around that same point (1m wide x 2m long rectangle) show evidence of compaction indicated by increased soils density (**Figure 5**, coarse blocky/platy structure), puddling or compacted deposits of slash and organic debris. Although coarser than clay, soils with silt when wet are highly sensitive to machine wheels or tracks.

Compaction was assessed two ways: (i) by comparing soil structure at survey point to soil conditions of adjacent undisturbed areas (i.e., at similar soil water content) - the "natural soil condition" was checked frequently by digging to ascertain compaction during our survey-, and (ii) by measuring bulk density at 10 random locations (5 undisturbed & 5 disturbed samples) using the excavation method. The bulk density of the soil is used to give an indication of the porosity and structure of the soil after trafficking by logging equipment. Bulk density is defined as the mass of soil per unit volume of undisturbed soil or bulk soil volume and expressed as Mg/m^3 . Our bulk density results showed that after logging, soils were 60% heavier than undisturbed soils from a average of 0.98 Mg/m^3 to 1.61 Mg/m^3 ($1 \text{ Mg} = 1 \text{ metric ton}$).

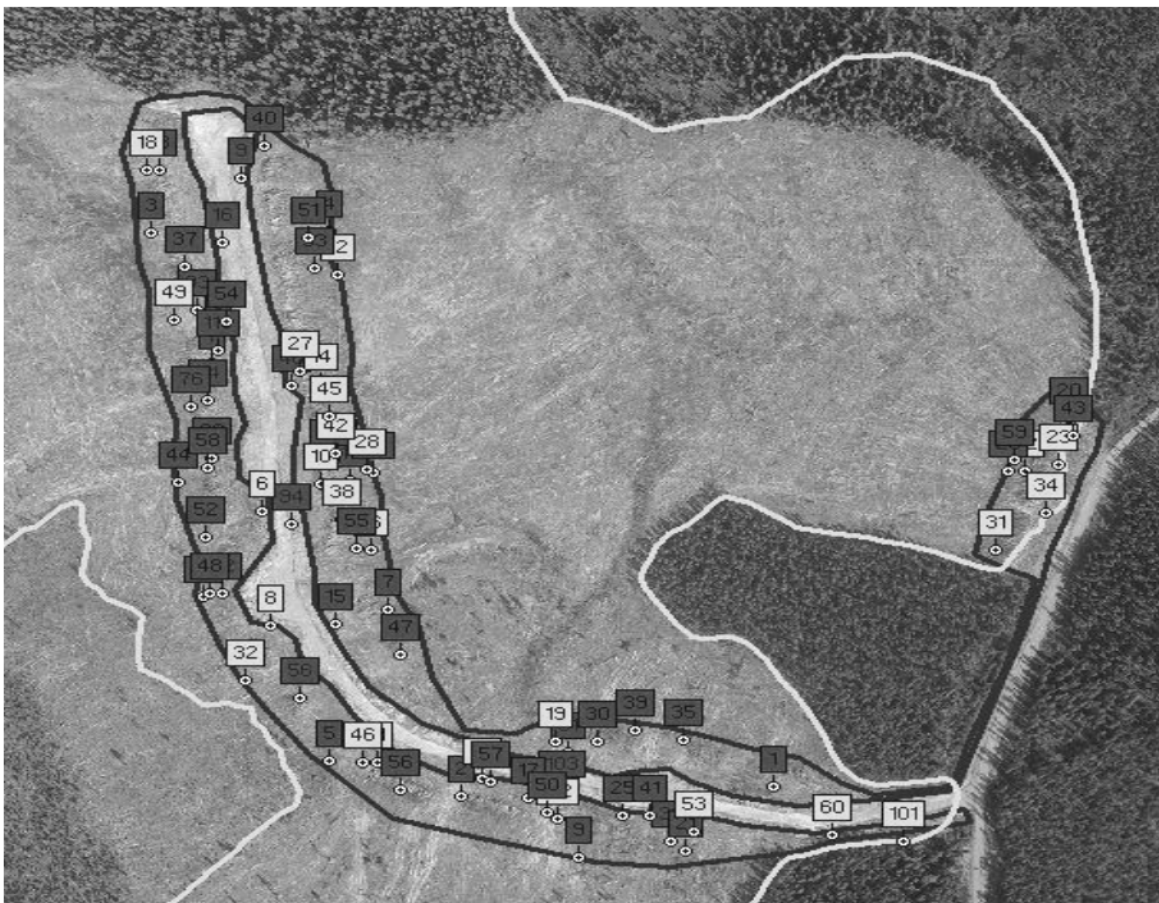


Figure 4. GPS soil survey map showing soil disturbance results at random locations (or waypoints) in RWA's GPS soil survey map (RWA's only): Waypoints are identified as non-counted disturbance (**yellow**) or counted disturbance (**red**).

Conclusion

C&E Nadina Unit concerns that the soil disturbance limits may have been exceeded in block were justified. As confirmed by a formal soil conservation survey, extensive soil compaction occurred when heavy weight loads compressed the soil during operations within the NAR and RWA's. Indeed, the agreement holders of Non Renewal Forest Licence A72921 have not met soil objectives under section 3.2 of their FSP.



Figure 5. Example of the compaction process: Fluffy or loosely arranged soil (left) turns into compacted structure (right) during logging when soil is wet. Water flow and nutrient uptake by plants are impeded therefore can decrease site productivity.

Excessive soil disturbance has adversely altered ecosystem integrity by altering the way the soil functions on this site and therefore, the capacity of this site to grow forest has been diminished. Logging traffic lead to changes to: (i) structural properties of the soil as shown by significant amount of ruts and compaction on random trails and within RWA's, (ii) natural drainage patterns that were not maintained as evidenced from ponded water in the north end portion, and (iii) almost complete loss of forest floor within some areas that results in loss of habitat for specialist species (e.g., worms, fungi, microbes etc.) important to soil biodiversity (see pictures in **Appendix C**).

This site has low load-bearing strength materials when wet. Silty soils drain slowly and after prolonged rainfalls, become quickly water logged. In forests, finer-textured soils behave the same way they do in cultivated soils or in urban settings. Thus, a person can reasonably expect that compaction will be a concern with careless logging. If someone had paid any attention to weather and moisture in the soil prior to logging, there is no doubt that this damage could have been avoided.

Proper scheduling with regards to available moisture in the soils, lowering ground pressure by equipment on trafficked trails and better use of slash mats prior to skidding (these need to be removed after logging is completed so it does not hinder growth) are important for soil conservation.

Please, do not hesitate to contact me for further discussion.

Sincerely,



Stéphane Dubé, M.Sc./RPF
Soil Scientist
BC Forest Service

Appendix A

Excerpt from 0639881 B.C. LTD FSP:

3.2 Objectives Set by Government for Soils

FPPR, s.5: “The objective set by government for soils is, without unduly reducing the supply of timber from British Columbia’s forests, to conserve the productivity and the hydrologic function of soils”

For this objective, the agreement holders undertake to comply with s.35 and s.36 of the FPPR during the term of the FSP, within the Lakes North and Lakes South FDU

Appendix B

Literature cited

BC Forest Service. 2001. **Soil conservation surveys guidebook**. 2nd ed. Forest Practices Branch, Victoria, B.C. Forest Practices Code of British Columbia Guidebook.

<http://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/SOILSURV/Soil-toc.htm>

Bill Chapman, Steve Thompson, Peter Ott, Mike Curran and Shannon Berch. 2013. **A Field Guide for Surveying Soil Disturbance Using Random Sampling**. BC FREP Technical note #5.

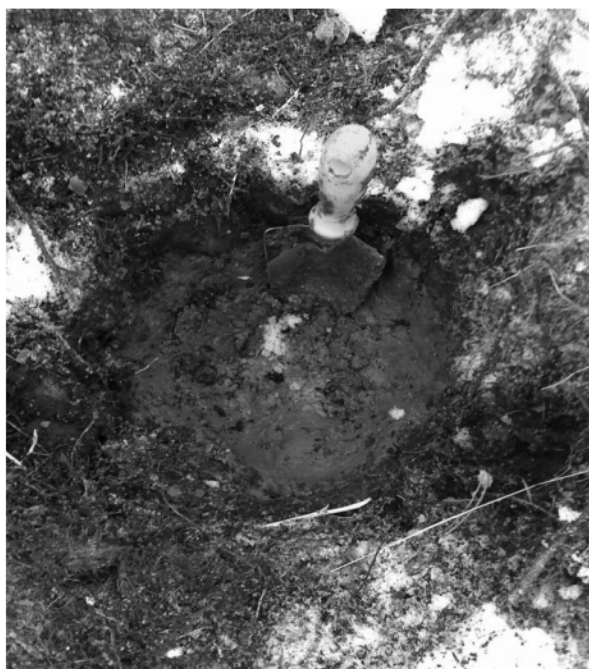
http://www.for.gov.bc.ca/ftp/HFP/external/!publish/frep/technical/FREP_Technical_Note_05.pdf

Mike Curran, Stephane Dubé, Chuck Bulmer, Shannon Berch, Bill Chapman, Graeme Hope, Sandy Currie, Paul Courtin and Marty Kranabetter. 2009. **Protocol for Soil Resource Stewardship Monitoring: Cutblock Level. Forest and Range Evaluation Program**. B.C. Min. For. Ran. and B.C. Min. Env., Victoria, BC.

<http://www.for.gov.bc.ca/ftp/hfp/external/!publish/frep/indicators/Indicators-Soils-Protocol-2009-May26-2009.pdf>

Appendix C

Pictures from A72921 CP008 CB18



"mud soup" or soil damaged structure



Compacted soils like solid rock where soils are drier



Bulk density sampling by excavation



High water table in the cutblock <5 cm depth



Looking northeast, large compacted area >1 ha (red perimeter) and RWA disturbances



Looking southeast, same compacted area > 1 ha and additional RWA disturbance



Looking northeast, same compacted area >1 ha, RWA disturbance and area of concentrated disturbance (orange perimeter) and impeded drainage (blue perimeter).

Blackwell, Jason FLNR:EX

From: Stephane Dube s.22
Sent: Thursday, October 2, 2014 10:07 AM
To: Blackwell, Jason FLNR:EX
Subject: Re: WFN - OTBH DND 30303 - Soil survey data

Hey Jason. Good to hear from you. I'll look for the information. Gimme till early next week.

Talk to you later.

"We know more about the movement of celestial bodies than about the soil underfoot"
- da Vinci

Stephane
Soil Scientist / Teacher
College of New Caledonia

On Oct 2, 2014, at 09:46, Blackwell, Jason FLNR:EX <Jason.Blackwell@gov.bc.ca> wrote:

Stephane

Sorry, I hate to bother you at home with a work related question, but would you happen to have access to the information requested, or let Shannon know where she could find it.

thanks

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

From: Carson, Shannon B FLNR:EX
Sent: Tuesday, September 30, 2014 11:13 AM
To: Blackwell, Jason FLNR:EX
Cc: Bilodeau, Normand G FLNR:EX
Subject: RE: WFN - OTBH DND 30303 - Soil survey data

No, I do not. Stephane indicated that he will continue to meet earlier commitments on two NR

NR Does your enquiry relate to either of these?

Shannon Carson
Research and Stewardship Team Leader
Phone: 250-565-6214
shannon.carson@gov.bc.ca

From: Blackwell, Jason FLNR:EX
Sent: Tuesday, September 30, 2014 10:23 AM
To: Carson, Shannon B FLNR:EX
Subject: FW: WFN - OTBH DND 30303 - Soil survey data

Shannon

I see that Stephane is away for some time, and he has you tagged as a contact. Would you happen to have access to this information I need?

Thanks

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

From: Blackwell, Jason FLNR:EX
Sent: Tuesday, September 30, 2014 10:19 AM
To: Dube, Stephane FLNR:EX
Subject: FW: WFN - OTBH DND 30303 - Soil survey data

Stephane

Do you have any of the data that Mr.Shelford is requesting? He is the lawyer that is representing the licensee for the case file you helped us with a while back. A72921, Cp008, blk 18.

thanks

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

From: Jeremy Shelford [<mailto:JShelford@ratcliff.com>]
Sent: Monday, September 29, 2014 10:10 AM
To: Blackwell, Jason FLNR:EX
Subject: WFN - OTBH DND 30303 - Soil survey data

Hi Jason,

I've marked a paragraph in the attached.

Can you please provide me with the empirical data (i.e. field notes/observations, etc.) used by Mr. Dube to reach the soil compaction conclusions in the attached? The soil survey cards in the binder don't seem to include this data. I'm thinking that there should be notes notes/observations on the excavation

method used to measure bulk density and his comparisons of soil at disturbed areas vs. non-disturbed areas.

Thanks.

Jeremy

Jeremy Shelford, RPF

Suite 500, 221 W. Esplanade
North Vancouver, B.C. V7M 3J3
Ph: 604-998-1140 Fax: 604-998-1452

Ratcliff & Company LLP
Lawyers

<image001.jpg>

www.Ratcliff.com

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Blackwell, Jason FLNR:EX

From: Dube, Stephane FLNR:EX
Sent: Tuesday, September 3, 2013 11:51 AM
To: Blackwell, Jason FLNR:EX
Subject: RE: Road Side Work Area - more points
Attachments: RWA 60 pts.gpx

You bet. Hope that works this time.

Will let you know when I go back for soil sampling shortly.

"A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people. " — Franklin D. Roosevelt

Stéphane Dubé, M.Sc., RPF
Soil Scientist
BC Forest Services - Omineca
1044 5th Ave, 5th floor
Prince George, BC
V2L 5G4
Phone: (250) 565-4363

From: Blackwell, Jason FLNR:EX
Sent: Wednesday, August 28, 2013 9:24 AM
To: Dube, Stephane FLNR:EX
Subject: RE: Road Side Work Area - more points

Could you send these in a gpx format, so I can load them into my Garmin.

Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279

From: Dube, Stephane FLNR:EX
Sent: Monday, August 19, 2013 8:10 AM
To: Blackwell, Jason FLNR:EX
Cc: Brochez, Pat E FLNR:EX
Subject: Road Side Work Area - more points

Hi. I forgot about this...My apologies.

Find attached 60 additional points within RWA in kml format.

I plan to go and collect soil samples this week or in early September.

Thanks.

"A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people. " — Franklin D. Roosevelt

Stéphane Dubé, M.Sc., RPF
Soil Scientist
BC Forest Services - Omineca
1044 5th Ave, 5th floor
Prince George, BC
V2L 5G4
Phone: (250) 565-4363

Blackwell, Jason FLNR:EX

From: Dube, Stephane FLNR:EX
Sent: Wednesday, April 10, 2013 10:40 AM
To: Blackwell, Jason FLNR:EX
Cc: Brochez, Pat E FLNR:EX
Subject: A72291 CP8 CB18 - Site deg
Attachments: A72291 CP8 CB18 North.tif; A72291 CP8 CB18 South.tif; waypoint list.pdf

Importance: High

Hey Jason, A quick update on the site deg at CB18. Within the NAR, soil disturbance exceeded 35% based on 76 points (soil limit of 10%). This is highly significant and therefore, adding more points would be futile.

Within the RWA's, we counted 18 points out of 20 surveyed points. This means a 90% disturbance level. Increasing sample size will not affect the non-compliance but there may be a perception that the sampling is too small and that the result is bias. Therefore, I suggest that we add around 40 points this spring (one-day's worth of field time).

As for the bulk density, this didn't go well. Because of a large sampling error, it does appear that is no logging effects on soils. It can be explained by the fact that sample size was consistently smaller in the trails compared to off-trails. There was also too much snow and water in the trails so we over-estimated the volume size of samples. I had a gut feeling that something was bad. If you recall, there was a snowstorm that day. In spite of the less than ideal conditions, in the trails bulk density reached 1.23 kg/m³ (or 30% bigger than in undisturbed areas) indicating compaction in my opinion. Anyways, we need to redo the sampling out there in June.

I have attached the soil survey map (north and south sides) and waypoint list for your files. On the map, yellow flags mean no disturbance at the point, silver flag means "outside" points and red flags show counted disturbance (eg. E for repeated machine traffic). I have also drawn the 2.8 ha compacted area (green dotted lines). Combined with the "beat-up" RWA's (4.2 ha, 3 polygons), excessive site disturbance adds up to 7 ha. To me, that is unacceptable and must be considered environmental damage.

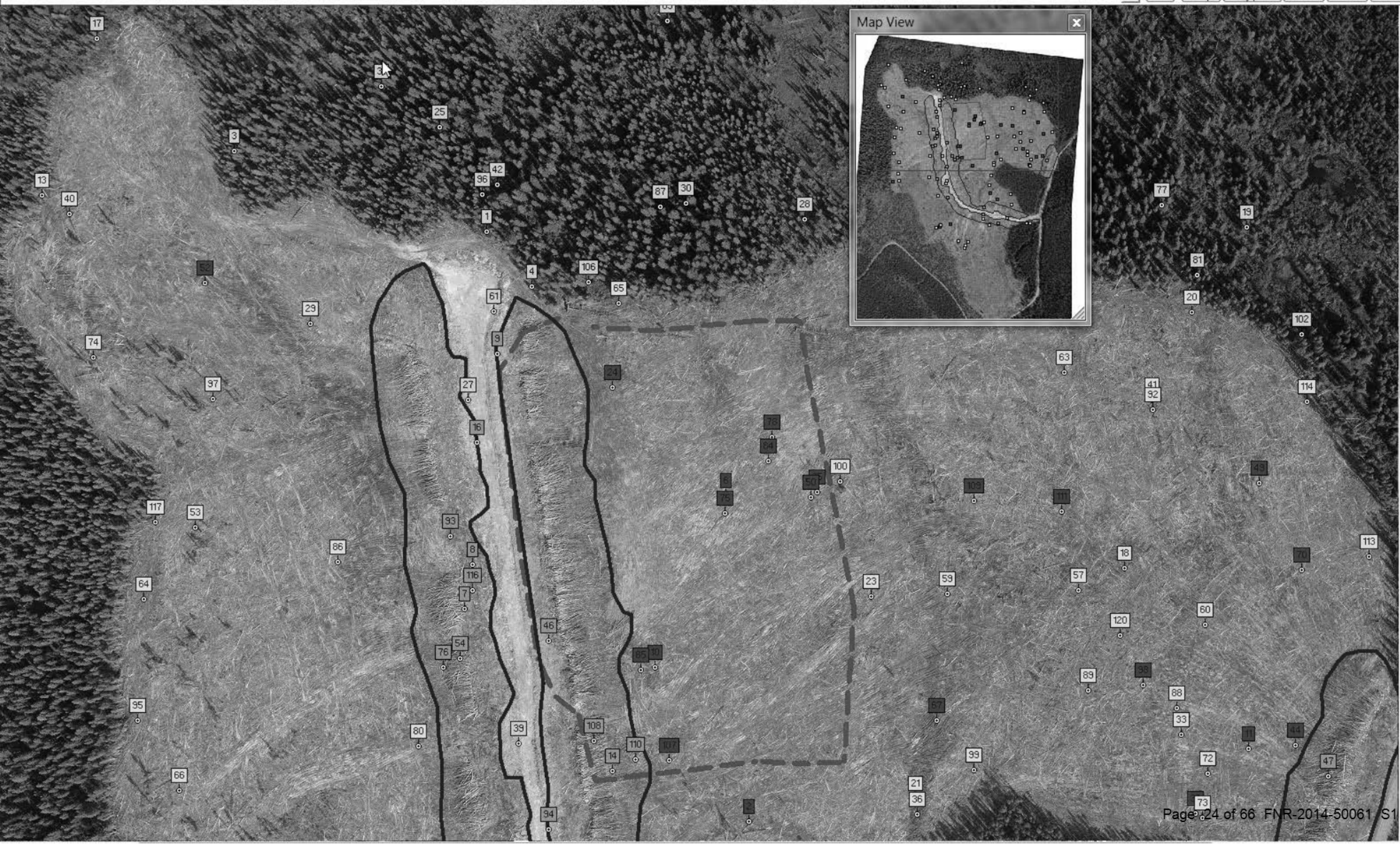
We must schedule 1 day sometime in June to get together and finish off the survey in the RWA's and collect samples for compaction.

Any questions?

Thanks.

"A nation that destroys its soils destroys itself. Forests are the lungs of our land, purifying the air and giving fresh strength to our people. " — Franklin D. Roosevelt

Stéphane Dubé, M.Sc., RPF
Soil Scientist
BC Forest Services - Omineca
1044 5th Ave, 5th floor
Prince George, BC
V2L 5G4
Phone: (250) 565-4363





Waypoint List

Map Name : Opening_burns_lake_10cm_utm09_2012_mosaic
 Map File : E:\Stephane main\Burns Lake - Nadina\Opening_burns_lake_10cm_utm09_2012_mosaic.map

Datum : NAD83

Waypoint File : E:\Stephane main\Burns Lake - Nadina\120 pts results.wpt

4/10/2013 4:49:32 PM

Num	Name	Zone	Easting	Northing	Alt(ft)	Description
1	1	9U	680180	6022106		out
2	2	9U	680298	6021839		Ts
3	3	9U	680066	6022142		out
4	4	9U	680200	6022081		out
5	5	9U	680173	6021623		
6	6	9U	680288	6021987		A
7	7	9U	680170	6021936		V RWA
8	8	9U	680173	6021956		Ts RWA
9	9	9U	680184	6022051		E RWA
10	10	9U	680255	6021909		E
11	11	9U	680523	6021872		L
12	12	9U	680357	6021771		
13	13	9U	679979	6022122		
14	14	9U	680236	6021862		E RWA
15	15	9U	680184	6021625		E
16	16	9U	680175	6022011		E RWA
17	17	9U	680004	6022193		out
18	18	9U	680468	6021954		
19	19	9U	680523	6022108		out
20	20	9U	680498	6022070		
21	21	9U	680373	6021850		
22	22	9U	680148	6021799		
23	23	9U	680353	6021941		
24	24	9U	680236	6022035		A
25	25	9U	680159	6022153		out
26	26	9U	680222	6021636		E
27	27	9U	680171	6022030		out
28	28	9U	680323	6022112		out
29	29	9U	680100	6022064		
30	30	9U	680269	6022119		out
31	31	9U	680132	6022171		out
32	32	9U	680500	6021843		E
33	33	9U	680493	6021879		
34	34	9U	680432	6021741		
35	35	9U	680329	6021988		E
36	36	9U	680374	6021843		
37	37	9U	680272	6021552		
38	38	9U	680389	6021639		E RWA
39	39	9U	680194	6021875		out
40	40	9U	679991	6022114		
41	41	9U	680480	6022030		
42	42	9U	680185	6022127		out
43	43	9U	680037	6021812		
44	44	9U	680545	6021874		L
45	45	9U	680248	6021577		
46	46	9U	680208	6021921		E RWA
47	47	9U	680560	6021860		E
48	48	9U	680205	6021778		out
49	49	9U	680528	6021992		Ts
50	50	9U	680326	6021986		E
51	51	9U	680340	6021694		E RWA
52	52	9U	680052	6022083		Ts
53	53	9U	680048	6021972		
54	54	9U	680168	6021913		E RWA
55	55	9U	680420	6021658		out
56	56	9U	680211	6021728		V RWA
57	57	9U	680447	6021944		
58	58	9U	680385	6021721		E
59	59	9U	680387	6021942		
60	60	9U	680504	6021929		

Waypoint List continued

Num	Name	Zone	Easting	Northing	Alt(ft)	Description
61	61	9U	680183	6022070		out
62	62	9U	680362	6021745		Td
63	63	9U	680440	6022042		
64	64	9U	680025	6021940		
65	65	9U	680239	6022074		
66	66	9U	680041	6021853		
67	67	9U	680383	6021885		Td
68	68	9U	680187	6021632		
69	69	9U	680261	6022201		out
70	70	9U	680548	6021953		E
71	71	9U	680041	6021788		
72	72	9U	680505	6021861		
73	73	9U	680503	6021841		
74	74	9U	680002	6022049		
75	75	9U	680287	6021979		A
76	76	9U	680160	6021909		E RWA
77	77	9U	680484	6022118		out
78	78	9U	680308	6022013		E
79	79	9U	680020	6021785		E
80	80	9U	680149	6021874		
81	81	9U	680500	6022086		out
82	82	9U	680175	6021793		E RWA
83	83	9U	680178	6021734		
84	84	9U	680306	6022002		E
85	85	9U	680249	6021908		E
86	86	9U	680112	6021957		
87	87	9U	680258	6022117		out
88	88	9U	680491	6021891		
89	89	9U	680451	6021899		
90	90	9U	680208	6021787		out
91	91	9U	680363	6021806		
92	92	9U	680480	6022026		
93	93	9U	680163	6021968		W RWA
94	94	9U	680208	6021836		E RWA
95	95	9U	680022	6021885		
96	96	9U	680177	6022123		out
97	97	9U	680056	6022030		
98	98	9U	680476	6021901		G
99	99	9U	680400	6021863		
100	100	9U	680339	6021993		
101	101	9U	680500	6021639		RWA
102	102	9U	680548	6022060		out
103	103	9U	680337	6021670		V RWA
104	104	9U	680358	6021633		
105	105	9U	680273	6021561		
106	106	9U	680225	6022083		out
107	107	9U	680262	6021867		E
108	108	9U	680228	6021876		E RWA
109	109	9U	680400	6021984		Ts
110	110	9U	680247	6021868		E RWA
111	111	9U	680439	6021980		Td
112	112	9U	680335	6021653		RWA
113	113	9U	680578	6021959		
114	114	9U	680550	6022029		
115	115	9U	680489	6021639		out
116	116	9U	680173	6021944		E RWA
117	117	9U	680030	6021975		
118	118	9U	680437	6021702		
119	119	9U	680284	6021573		
120	120	9U	680466	6021923		

Map Feature Waypoints

Waypoint List

A72291 CB8 CB18

Map Name : Opening_burns_lake_10cm_utm09_2012_mosaic
Map File : E:\Stephane main\Burns Lake - Nadina\Opening_burns_lake_10cm_utm09_2012_mosaic.map

Datum : NAD83

Waypoint File : E:\Stephane main\Burns Lake - Nadina\120 pts results.wpt

4/8/2013 3:05:59 PM

Num	Name	Zone	Easting	Northing	Alt(ft)	Description
1		9U	680180	6022106		out
2		9U	680298	6021839		Ts
3		9U	680066	6022142		out
4		9U	680200	6022081		out
5		9U	680173	6021623		
6		9U	680288	6021987		A
7		9U	680170	6021936		V RWA
8		9U	680173	6021956		Ts RWA
9		9U	680184	6022051		E RWA
10		9U	680255	6021909		E
11		9U	680523	6021872		L
12		9U	680357	6021771		
13		9U	679979	6022122		
14		9U	680236	6021862		E RWA
15		9U	680184	6021625		E
16		9U	680175	6022011		E RWA
17		9U	680004	6022193		out
18		9U	680468	6021954		
19		9U	680523	6022108		out
20		9U	680498	6022070		
21		9U	680373	6021850		
22		9U	680148	6021799		
23		9U	680353	6021941		
24		9U	680236	6022035		A
25		9U	680159	6022153		out
26		9U	680222	6021636		E
27		9U	680171	6022030		out
28		9U	680323	6022112		out
29		9U	680100	6022064		
30		9U	680269	6022119		out
31		9U	680132	6022171		out
32		9U	680500	6021843		E
33		9U	680493	6021879		
34		9U	680432	6021741		
35		9U	680329	6021988		E
36		9U	680374	6021843		
37		9U	680272	6021552		
38		9U	680389	6021639		E RWA
39		9U	680194	6021875		out
40		9U	679991	6022114		
41		9U	680480	6022030		
42		9U	680185	6022127		out
43		9U	680037	6021812		
44		9U	680545	6021874		L
45		9U	680248	6021577		
46		9U	680208	6021921		E RWA
47		9U	680560	6021860		E
48		9U	680205	6021778		out
49		9U	680528	6021992		Ts
50		9U	680326	6021986		E
51		9U	680340	6021694		E RWA
52		9U	680052	6022083		Ts
53		9U	680048	6021972		
54		9U	680168	6021913		E RWA
55		9U	680420	6021658		out
56		9U	680211	6021728		V RWA
57		9U	680447	6021944		
58		9U	680365	6021721		E
59		9U	680387	6021942		
60		9U	680500	6021929		

Waypoint List continued

Num	Name	Zone	Easting	Northing	Alt(ft)	Description
61	61	9U	680183	6022070		out
62	62	9U	680362	6021745		Td
63	63	9U	680440	6022042		
64	64	9U	680025	6021940		
65	65	9U	680239	6022074		
66	66	9U	680041	6021853		Td
67	67	9U	680383	6021885		out
68	68	9U	680187	6021632		E
69	69	9U	680261	6022201		
70	70	9U	680548	6021953		
71	71	9U	680041	6021788		
72	72	9U	680505	6021861		
73	73	9U	680503	6021841		
74	74	9U	680002	6022049		
75	75	9U	680287	6021979		A
76	76	9U	680160	6021909		ERWA
77	77	9U	680484	6022118		out
78	78	9U	680308	6022013		E
79	79	9U	680020	6021785		E
80	80	9U	680149	6021874		out
81	81	9U	680500	6022086		ERWA
82	82	9U	680175	6021793		
83	83	9U	680178	6021734		E
84	84	9U	680306	6022002		E
85	85	9U	680249	6021908		out
86	86	9U	680112	6021957		
87	87	9U	680258	6022117		out
88	88	9U	680491	6021891		
89	89	9U	680451	6021899		out
90	90	9U	680208	6021787		
91	91	9U	680363	6021806		
92	92	9U	680480	6022026		WRWA
93	93	9U	680163	6021968		ERWA
94	94	9U	680208	6021836		
95	95	9U	680022	6021885		out
96	96	9U	680177	6022123		G
97	97	9U	680056	6022030		
98	98	9U	680476	6021901		
99	99	9U	680400	6021863		
100	100	9U	680339	6021993		RWA
101	101	9U	680500	6021639		out
102	102	9U	680548	6022060		VRWA
103	103	9U	680337	6021670		
104	104	9U	680358	6021633		
105	105	9U	680273	6021561		out
106	106	9U	680225	6022083		E
107	107	9U	680262	6021867		ERWA
108	108	9U	680228	6021876		Ts
109	109	9U	680400	6021984		ERWA
110	110	9U	680247	6021868		Td
111	111	9U	680439	6021980		RWA
112	112	9U	680335	6021653		
113	113	9U	680578	6021959		
114	114	9U	680550	6022029		out
115	115	9U	680489	6021639		ERWA
116	116	9U	680173	6021944		
117	117	9U	680030	6021975		
118	118	9U	680437	6021702		
119	119	9U	680284	6021573		
120	120	9U	680466	6021923		

Map Feature Waypoints

NAR, 76 pts total
27 pts counted

35.5% > 14.7%
±10%, 30

RWA 20 pts total
4.2 ha 18 pts counted

90% > 34%
±25%, 20

Compacted area
2.8 ha

Particle density pine 0.181 g/cm^3

A72921 C88 CB18

Db data at Burns Lake - C&E Investigation

$D_{\text{rock}} = 2.65 \text{ g/cm}^3$

Plot location	+W dry weight w CF (g)	VH Volume (cm ³)	DWC CF (g)	DWC CF (cm ³)	TW - DWC = DWF Dry weight without CF	VR Volume without CF	$V_F = V_H - V_R$ Db < 2mm	BDF $= DWF / V_F$
GPS #75	4500	2,932	3480	1832	691	1.24	2,668/1,641	1.62
GPS #50	2558	2,613	3900	820	309	0.97	1,738/2,304	0.75
GPS #24	4984	3,119.5	4650	1524	575	1.6	3,460/2,540	1.36
Undisturbed 1	100	7028	4870	2514	949	2.65	4,514/2,314	1.95
Undisturbed 2	36	6172	5500	2074	783	1.41	4,098/2,902	1.41
Undisturbed 4		7070	4700	322 3468		1.14		
Undisturbed 3	50	6150	4470	2750		1.73		
GPS #35		8008	4950	3518		1.34		
GPS #6		3460	4380	1072	156g	0.81		
undisturbed 5		5546	4320	2112	716	1.18	3,434/2,098	1.663

154g of pine chips → 154g → ? cm³ → 846 cm³
 $0.181 - 1 \text{ cm}$

$2.65 - 1 \text{ cm}$
 $1.832 - 1$

$0.181 - 1 \text{ cm}^3$
 $1837 \rightarrow 1$

$2.65 \text{ g} - \text{cm}^3$
 $1 \text{ cm} -$

Soil Sampling (A72921 008 18)

way pt # Vd.

6 4000ml + 380ml =

Burns Lake

(10/24/2012)

75 2000 + 1480 ml

29 2000 + 2030 + 620

50 2060 + 1840

35 920 + 2030 + 2000

Undist. 1 2040 + 2010 + 820

Undist. 2 2020 + 2000 + 1480

Undist. 3 460 + 2000 + 2010

Undist. 4 2070 + 2030 + 600

Undist. 5 260 + 2060 + 2000

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No. 312

A72921 CP 008 Block 18 Site Plan

Licence	A72921	Cutting Permit	008	Block	18	Opening #	
Total Area (ha)	26.6	NAR (ha)	22.8	Non-Prod. Nat (ha)	0.0	Non-Prod. Un-Nat. (ha)	0.4
Area of Reserve (ha)	3.4	Type of Reserve	WTP	Air Photo #s			
Harvest Method	Ground skidding						
Silviculture System	Clearcut						

SU	NAR (ha)	Biogeoclimatic Ecosystem Classification				Regeneration Method	Preferred Species	Acceptable Species
		Zone	Subzone	Variant	Site Series			
1	22.8	SBS	mc2		01 ₁₀	Planting	Pl, Sx	BI
Elevation range if planting is specified		1030-1050m						

A Free-Growing Stand will be established in accordance with the stocking specifications in the Forest Stewardship Plan for licence A72921.

SU	Species		Regen Date	FG Date	MITD	TSS	MSSpa	MSSp	Min. FG Ht by Species	
	Preferred	Acceptable	(yrs)	(yrs)	(m)	(sph)	(sph)	(sph)	Species	Ht (m)
1	Pl, Sx	BI	7	15	2.0	1200	700	600	Pl Others	1.6 0.8

Permanent Access Structures									
Roads	Length (m)	640	Width (m)	7	Area (ha)	0.4	Maximum % of the Total Cutblock Area to be Occupied by Permanent Access Structures		
Landings	Length (m)		Width (m)		Area (ha)				
Other	Length (m)		Width (m)		Area (ha)				
Total Cutblock Area (ha)		23.2	Total Area of Permanent Access (ha)		0.4 = 1.7%				
Trails that will be used for repeated harvest entries are proposed as permanent access structures.							No (Yes/No)		

Soil Disturbance		
Maximum Percentage of the Net Area to be Reforested to be occupied by Soil Disturbance (% of NAR)		10%
All areas of exposed soils greater than 0.1ha will be grass seeded as per section 4.1 of the FSP.		
Compaction Hazard	H	Erosion Hazard
		M
Displacement Hazard		M

Wildlife Tree Retention			
WTP # and Location in Relation to Cutblock	Description	Area	% of NAR
WTP 1 - External (North portion of block)	PISx831	1.0	
WTP 2 - External (North end of block)	PISx831	2.4	
Total:		3.4 ha	15%

Measures for Coarse Woody Debris
Leave a minimum of 4 logs/ha, each being a minimum of 2m in length and 7.5cm diameter on one end.

A72921 CP 008 Block 18 Site Plan

Non-Timber Resources and Resource Features in or adjacent to the cutblock	
Feature(s)	Measures to protect or accommodate or the reason for not protecting the feature(s)
Secondary Structure	This block has some suitable secondary structure, ~500 stems/ha of over 4m tall trees scattered throughout the block. Attempt to retain clumps of suitable regen or individual stems during harvesting where practicable.
Other tenures	This block surrounds and borders an existing opening on the south boundary. Stub trees along these boundaries to distinguish between the tenures.

Known Ungulate Winter Range			
Post harvest stand structure or description of trees to be removed			
<i>*This block is not in known Ungulate Winter Range.</i>			
Trees to be Retained	Species		
	Characteristics		
	Function		
Optional	Initial Basal Area (m ² /ha)	Residual Basal Area (m ² /ha)	or Residual Trees/ha

Riparian Management			
Riparian Class of Feature	S6	Designation on Map	Stream #1
		Falling and/or Skidding or Yarding Across a Stream	
		n/a	
Post Harvest Stand Structure		A 20m RMA will be established in the block. This area will retain immature PI, Sx, deciduous, and attempt to maintain any brush. Most of the RMA for this stream is outside the block. Only a very small area of RMA is inside the block and the main spur crosses through this area. It may be difficult to reserve any measurable trees due to the road crossing. Attempt to reserve measurable trees along the south boundary away from the road to meet the post harvest stand structure requirements.	
Trees to be Retained	Species	Measurable trees, of which no more than 50% can be deciduous.	
	Characteristics	Measurable trees are greater than or equal to 7.5 cm in diameter when measured 30 cm from ground level and is of a representative tree species found within the RMZ prior to harvesting.	
	Function	Provide a cover for wildlife.	
Minimum	Basal Area (m ² /ha)	or Trees/ha	20 or Number of Trees

Riparian Management			
Riparian Class of Feature	S6	Designation on Map	Stream #2
		Falling and/or Skidding or Yarding Across a Stream	
		n/a	
Post Harvest Stand Structure		The RMA for this block is entirely inside a WTP. No further action is required.	
Trees to be Retained	Species		
	Characteristics		
	Function		
Minimum	Basal Area (m ² /ha)	or Trees/ha	N/A or Number of Trees

Riparian Management			
Riparian Class of Feature	W1	Designation on Map	Wetland 1
		Falling and/or Skidding or Yarding Across a Stream	
		n/a	
Post Harvest Stand Structure		A 50m RMA will be established in the block. This area will retain Immature PI, Sx, deciduous, and attempt to maintain any brush.	
Trees to be Retained	Species	Measurable trees, of which no more than 50% can be deciduous.	
	Characteristics	Measurable trees are greater than or equal to 7.5 cm in diameter when measured 30 cm from ground level and is of a representative tree species found within the RMZ prior to harvesting.	
	Function	Provide a cover for wildlife.	
Minimum	Basal Area (m ² /ha)	or Trees/ha	20 or Number of Trees

A72921 CP 008 Block 18 Site Plan



Visual Quality

This block is not in a visually sensitive quality polygon. No further action is required.

Cultural Heritage Resources

~2ha of this block is in a medium-high or CHR polygon. No CMT's or other cultural heritage features were found during fieldwork. No further action is required.

RPF SIGNATURE AND SEAL:

		Date: 10/22/01 (mm/dd)
RPF Signature and Seal		
Sean Broadworth RPF Name (Printed)		

Db data at Burns Lake - C&E case
A72921 CP8 CB18

plot location	GPS #	dry weight TW g	VH cm3	DWC CF g	VR CF cm3	DWoody debris g	VWoody debris cm3	DWF=TW-DWC-DW	VF = VH-VR-VW	BDF=DWF/VF
	75	4500	3480	1832	691.3207547			2668	2788.679245	0.956725304
	50	2558	3900	820	309.4339623	144	795.5801105	1594	2794.985927	0.570306986
	24	4984	4650	1524	575.0943396			3460	4074.90566	0.849099412
	35	8008	4950	3548	1338.867925			4460	3611.132075	1.235069753
	6	3460	4380	1072	404.5283019	156	861.878453	2232	3113.593245	0.716856643
undisturbed 1		7028	4870	2514	948.6792453			4514	3921.320755	1.151142761
undisturbed 2		6172	5500	2074	782.6415094			4098	4717.358491	0.868706503
undisturbed 3		6150	4470	2750	1037.735849			3400	3432.264151	0.990599747
undisturbed 4		7070	4700	3468	1308.679245			3602	3391.320755	1.062123067
undisturbed 5		5546	4320	2112	796.9811321			3434	3523.018868	0.974732219



A33801

Canadian Forest Products Ltd. - Prince George Region

Aug 20, 2007

Site Plan

A. Tenure Identification

Licence	Permit	Block	Operating Area	Opening	Timbermark(s)	Gross Area (ha)	Net Area to Reforest (ha)	NAR	District
A40875	B66	CAR464	Mossvale	093J033-	FJ3B66	40.1	35.0	Fort	St. James Forest Distri

B. Area Summary and Description for Areas Not Contained Within NAR

Proposed Permanent Access (%)	Max. Permanent Access (%)	Wetland	Water	NP	Immature	NCBr > 4ha	Reserves	Total
2.4	7.0	0.0	0.0	0.0	0.0	0.0	5.1	5.1

C. Stand Level Biodiversity

Biological Diversity (%)
12.7

Biodiversity Comments:

LEAVE TREE SPECIFICATIONS

Biodiversity values will be maintained via external reserves (SU R). SUR consists of a P(Sx) type that is associated with a riparian management area.

The following trees will be retained where present and operationally feasible:

- Acceptable non-merchantable coniferous species in the pole, sapling and regen layers
- Deciduous species (may be stubbed at 3-5 metres)

Retain all Douglas -fir

Leave trees that are cut due to operational or safety constraints will remain on site (dispersed and un-processed). Roadside processing and decking areas will be clearcut.

Prescribed leave trees may be removed for building roads, roadside decking, felling access, skidding access, and safety reasons.

COARSE WOODY DEBRIS

The Coarse Woody Debris (CWD) target for the block is a minimum of 4 logs per hectare (each being a minimum of 2m long and 7.5cm in diameter at one end).

D. Net Area to Reforest (NAR)

SU	Area Description	NAR (ha)	Harvest System
A	SBSmk1 - 01 (Minor 09 , 0.5ha)	35.0	Clearcut with reserves
Critical site conditions that affect the timing of operations:			
Comments specific to SU A:			

E. Soil Conservation

SU	HAZARD RATINGS			Maximum Allowable Soil Disturbance (%)	Maximum Allowable Soil Disturbance at Roadside (%)	Maximum Soil Disturbance Temp. Exceeded (%)	Soil Horizon	Soil Texture	Coarse Fragment %
	Soil Compaction	Surface Soil Erosion	Soil Displacement						
A	Moderate	Moderate	Moderate	10.0	25.0	0.0	B	SL	35

Soil Conservation Comments: The soil protection objective is to minimize site disturbance and potential long term productivity losses.

F. Post Harvest Stocking Requirements

Stocking Standard Regime ID	SU	Layer	Assessment Dates			Preferred (P) Species Species - Min. FG Height (m)	Acceptable (A) Species Species - Min. FG Height (m)
			Regen Delay (yrs)	Early FG (yrs)	Late FG (yrs)		
1001476	A	L4	4		20	Fdi-1.4/Pli-2/Sx-1	

Stocking Standard Regime ID	SU	Layer	Well Spaced Trees (#/ha)			Maximum Coniferous (s/ha)
			Target/Minimum Preferred & Acceptable	Minimum Preferred	Minimum Horizontal Distance (m)	
1001476	A	L4	1200 / 700	700	2.0	10,000

Required Information For Stocking Requirements

G. Assessments

Type	Required	Management Strategies
Visual Impact Assessment	No	This block is not located within a visually sensitive area, therefore no VIA is required.
Archaeological Inventory and Impact Assessment	No	This block was rated as having a moderate likelihood of archaeological potential and therefore an assessment was not conducted. Should any cultural heritage resource features be identified during harvesting or road construction, operations that may negatively impact these resource features will be suspended or modified and appropriate Canfor personnel notified.
Terrain Stability Field Assessment	No	
Recreation Resource	No	No Recreation Site or Trail is within 100m of this block.

H. Riparian Management Strategies

Riparian ID / Lake ID	Riparian Class / Lake Class	RRZ Width (m)	RMZ Width (m)	Management Strategies - RRZ/RMZ
R1	S3	20	20	R1 - S3 is located on the east side of the block and is located a minimum of 30m outside the block boundary. Remaining portions of the RMZ that are within the harvested area of the block will be managed as per the specifications of the adjacent SU due to the presence of mountain pine beetle infested timber. /
R3	W1	10	40	/ R3 - W1 The RMZ for this feature is entirely outside the block boundary.
R4	W1	10	40	/ R4 - W1 The RMZ for this feature is entirely outside the block boundary.

Riparian Comments: Riparian assessments were conducted in June 2007 by Canfor Field Operations staff

Appendix C

Province of British Columbia

Random Method for Soil Conservation Surveys

Draft version – July 2011

Mike Curran, PhD, PAg, Forest Science and Silviculture Team Leader
(and Research Soil Scientist) Kootenay-Boundary Region, BC Forest
Service, (Ministry of Natural Resource Operations) Nelson, BC

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Compacted Areas	10

Introduction

The objective set by the BC Government for forest soil management is to “without unduly reducing the supply of timber from British Columbia’s forests, to conserve the productivity and the hydrologic function of soils” (Forest Planning and Practices Regulation). Soil disturbance levels are limited in the FRPA to the following levels:

- (a) if the standards unit is predominantly comprised of sensitive soils, 5% of the area covered by the standards unit, excluding any area covered by a roadside work area;
- (b) if the standards unit is not predominantly comprised of sensitive soils, 10% of the area covered by the standards unit, excluding any area covered by a roadside work area;
- (c) 25% of the area covered by a roadside work area (a roadside work area is defined as the area adjacent to a road where one or both of the following are carried out:

- (i) decking, processing or loading timber;
- (ii) piling or disposing of logging debris;

Sensitive soils are soils that, because of their slope gradient, texture class, moisture regime, or organic matter content have the following risk of displacement, surface erosion or compaction:

- (a) for the Interior, a very high hazard;
- (b) for the Coast, a high or very high hazard.

Because the MOF no longer verifies soil hazard ratings in prescriptions, a necessary first step in every survey is to determine the soil hazard rating. The rating determined by the surveyor is then used to determine which soil disturbance categories count, and the disturbance limits for the area to be surveyed.

Soil disturbance is defined as disturbance to the soil in the net area to be reforested in a cutblock because of:

- (a) temporary access structures,
- (b) gouges, ruts and scalps, or
- (c) compacted areas, but does not include the effect on the soil of rehabilitating an area in accordance with section 35 (Section 35 allows for up to 5% of the standards unit to be in excessive disturbance as long as enough of this excess disturbance is rehabilitated so that the disturbance limit is no longer exceeded).

Gouges, ruts, scalps and compacted areas are not defined except in the 2001 Soil Conservation Surveys guidebook. Temporary access structure is defined in regulation as an access structure that is not a gravel pit and does not meet the requirements of a permanent access structure which are:

(a) at the time of its construction, it is reasonably expected to provide access for timber harvesting and other activities that are not wholly contained in the cutblock, or

(b) it is constructed on or through, or contains, materials unsuitable for the establishment of a commercial crop of trees and is not an excavated or bladed trail, but does not include an area that contained an access structure before rehabilitation of the area under section 36.

An agreement holder may cause soil disturbance that exceeds the limits specified in subsection (3) if the holder:

(a) is removing infected stumps or salvaging windthrow and the additional disturbance is the minimum necessary, or

(b) is constructing a temporary access structure and both of the following apply:

(i) the limit set out in subsection (3) (a) or (b), as applicable, is not exceeded by more than 5% of the area covered by the standards unit, excluding the area covered by a roadside work area;

(ii) before the regeneration date, a sufficient amount of the area within the standards unit is rehabilitated such that the agreement holder is in compliance with the limits set out in subsection (3).

Rehabilitation is discussed further in the rehabilitation section below.

There are also limits placed on the amount of permanent access structure allowed in a block. An agreement holder must ensure that the area in a cutblock that is occupied by permanent access structures built by the holder or used by the holder does not exceed 7% of the cutblock, unless

(a) there is no other practicable option on that cutblock, having regard to

(i) the size, topography and engineering constraints of the cutblock,

(ii) in the case of a road, the safety of road users, or

(iii) the requirement in selection harvesting systems for excavated or bladed trails or other logging trails, or

(b) additional permanent access structures are necessary to provide access beyond the cutblock.

If an agreement holder exceeds the limit for permanent access structures described in subsection (1) for either of the reasons set out in that subsection, the holder must ensure that the limit is exceeded as little as practicable.

In order to assess whether or not these regulations are being addressed requires definition of terms and a method for measuring the levels of the various disturbances discussed above. This was done in the 2001 Soil Conservation Surveys Guidebook. This guidebook breaks blocks into two categories, small and large and provides two different methods of survey. The big block method was prone to giving large confidence intervals because it utilized a clustered sampling design. The clustered sampling design was a trade-off developed to allow sampling many points in a large block in an efficient manner. The small block method was to have been the preferred method, but when the

option of stratifying blocks for compliance assessment was removed, the small block method was not applied directly to big blocks because it is excessively time consuming to apply over a large area.

Advancements in GPS and handheld computer technology mean that options are now available to surveyors that were not available when the last guidebook was written. Sampling theory tells us that completely random sampling is the most consistently successful approach for achieving a truly representative sample of a population with the least number of points sampled. That basic principal is confirmed, in a work recently completed by Thompson et al, for the case involving sampling logging disturbance in cutblocks. The next best design is a completely square grid, which is labour intensive and requires the most of amount of walking to implement. The further the design gets from square, the easier it is to implement, but the higher the risk there is of a nonrepresentative sample if the population being sampled is not evenly distributed. Logging disturbance is typically very non-uniform in distribution and may be clustered or linear and so the orientation of non-square sampling grids in relation to disturbance is always a concern.

Until recently, layout of completely random sampling networks over large areas, using commonly available field equipment, has been very labour intensive. However, using readily available GPS technology, it is now relatively easy to take an unbiased-random sample from cutblocks. The method also has the advantage of very little layout time and less walking (especially backtracking) than would be necessary for sampling on the squarer grid layouts. In addition, the completely random design gives lower variability than grid designs for sampling logging type disturbance (Thompson et al??) and determination of confidence intervals is based on binomial distributions. If more power is needed for a particular survey, it is a simple matter to add more random points and resurvey the area without having to worry about creating new grids or infilling grids. For measuring roads, landings, trails and other distinct features within a block, relatively cheap digital imagery can be used for highly accurate and inexpensive assessment of these features, though the older ground based approaches used in the Soil Conservations Surveys Guidebook, can still be used. A high resolution digital image makes a very good base map for the random survey and wherever possible, the use of these images is encouraged.

This guide book outlines the general procedure for estimating dispersed disturbance levels in cutblocks of all sizes using a random sampling approach. It also describes a method for measuring other disturbance features from digital air photos.

Measuring Dispersed Disturbance Using a Random Approach

There may be many ways to achieve a random survey- this manual outlines one that is utilizes relatively commonly available technology. The broad steps are as follows:

1. Based on the estimated disturbance levels the number of points that need to be sampled to achieve the desired confidence interval is estimated. For a typical survey of a block with 5% to 10% disturbance, 200 points gives a one sided 90% confidence interval of about 3 percentage points. This means that blocks will be called excessively disturbed if the measured disturbance exceeds 13% for a 10% disturbance limit block or 8% for a 5% limit block. In other words, with a sample size of 200 points on 10% disturbance limit blocks, if the number of disturbed points equals or exceeds 26 counted points, then the one-sided 90% lower confidence limit of the measured disturbance in the block is higher than the maximum. If the number of disturbed points in a 200 point survey, of a 5% disturbance limit block, equals or exceeds 16 points, then the one-sided 90% lower confidence limit of the measured disturbance in the block is higher than the maximum. It should not be necessary to survey more than 200 points in a block (or stratum), but if a block (or stratum) is highly disturbed, it may be feasible to survey fewer points. Appendix B shows how to determine confidence intervals for surveys of other numbers of survey points or other levels of disturbance. The higher the disturbance level, the fewer points are needed in the total survey to establish with confidence that the block is over the limit. The size of the block has no bearing on the number of points, but unavoidably, the larger the block, the more time it takes to survey.
2. An appropriate number of random waypoints are generated. There may be other ways to do this, but one method involves creating a shape file of the NAR (survey stratum minus roads, landings or other features which are not part of the NAR). A multipoint polygon is generated in Arcmap using a Random Point-in-Polygon Generation Program (VBA Macro) (Sawada, 2002). The multipoint polygon is converted to waypoints in OziExplorer or other mapping software that has this function.
3. The waypoints and a base map are downloaded onto a GPS unit that is set up to beep when the surveyor passes within 1 metre of the waypoint. The surveyor navigates to the waypoint and the exact observation point is indicated by the precise moment at which the GPS beeps. The observation point is fixed exactly at that moment by some arbitrary locator of the observation point. For example the observation point could be deemed to be located directly below one corner of the GPS unit or at the end of the surveyor's right toe, wherever those are at the moment the GPS beeps. The same locator should be used throughout a survey.
4. The survey progresses by using the built in navigation aids in the GPS to move from waypoint to waypoint. The surveyor is free to select the most efficient route through the points.
5. The data is entered directly into the GPS unit.
6. All of the points generated for a particular survey must be surveyed, i.e. one cannot survey points in a portion of the block and then conclude that the surveyed

area is or is not in compliance. Since disturbance within a cutblock is usually distributed unevenly, the entire set of points must be surveyed before making judgements about the level of disturbance. However, it is possible to initially do a complete survey with a smaller number of points and if that survey does not have sufficient power to give a clear result, a new set of random points can be generated for the same area and surveyed and the results combined with the previous survey to create a more powerful survey.

7. When the survey is complete, the waypoint file is converted to a spreadsheet file, and the calculations are made on the spreadsheet.

Many different configurations of hardware and software can be used to achieve a random survey and it is not possible to cover all those in this guidebook. Presented in Appendix A is a detailed protocol for a particular set of software and hardware. Potential surveyors who wish to use other software/hardware combinations may find some useful tips in this guidance, but they are not required to use the equipment combination described. The fully random survey needs to meet the following criteria:

1. The observation points must be randomly generated with any point in the survey area having a chance to be surveyed.

2. When the actual observation point is located in the field, it must be selected by following an unbiased and precise rule, such as directly under the GPS at the exact moment the GPR beeps (or some other confining trigger). The surveyor must not adjust the observation point in any way, nor have leeway to select the sampling point from within a broader possible sampling area, e.g., it would be unacceptable to simply select the sampling point from anywhere in front of the surveyor at the point the GPS beeps.

3. When the lower one-sided 90% confidence limit for the measured disturbance level is greater than the disturbance limit, the block is counted as over. Whatever size of survey indicates the block is over the lower 90% confidence limit, is acceptable. For surveys where the disturbance limit is greater than the one-sided 90% lower confidence limit, in order for the block to be considered under the disturbance limit- the lower one-sided 90% confidence interval must be 3 percentage units or less, (see Point 4 below). This is to address the situation where a surveyor might choose to survey fewer points because the disturbance is greatly in excess of the limit. Surveying fewer points means that the confidence interval could be larger if the surveyor overestimated the level of disturbance. This situation would make it more likely that the disturbance limit of a block will lie in the ambiguous zone of the confidence interval (between the lower confidence limit and the measured level of disturbance). Therefore, for blocks with disturbance close to the limit, the surveyor must sample sufficient points to make the lower confidence interval $\leq 3\%$ points. In cases where the measured level of disturbance is $\leq 3\%$, the upper 90% confidence interval must be $\leq 3\%$ points. For disturbance levels greatly above or below the limits, a survey could have fewer than 200 points and still be valid as long as the disturbance limit still fell below the 90% confidence interval (i.e., the block is counted as over). For example, if the actual level of disturbance on a block with a 10% disturbance limit

was 30%, it would take fewer points to establish if the block was in compliance (see below). If the surveyor chooses to do a smaller survey based on an assumption about the disturbance level that turns out to be incorrect and as a result the outcome of the survey is ambiguous, the surveyor can simply generate another set of random waypoints and add to the survey.

There are normally financial constraints to doing large surveys and a 200 point survey with one-sided confidence interval of around 3 percentage points for disturbance levels in the range of the normal limits (5 to 10%) will give an acceptable level of precision. This means that before a block is called excessively disturbed, the measured disturbance levels will exceed 13% or 8% for the 10% and 5% limits respectively. If a licensee finds themselves in a situation where the lower confidence limit from the survey is slightly higher than the disturbance limit, they can increase the survey size to any size they deem fit to get a more precise measure of disturbance. However, it should be remembered that the most probable level of disturbance is near the mean level determined by the survey. When a block is marginally over the limit the most likely outcome is that more points will narrow the confidence interval around a point close to the original mean.

4. Each point in a stratum or block being surveyed must have the same chance of being sampled. This means that it is not acceptable to survey some arbitrarily chosen subset of the points in a set of random waypoints (e.g. ½ the block) and then stop because it appears the survey will be over or under. However, it is acceptable to do a survey with fewer sample points based on an estimation of a level of disturbance within the block that suggests actual disturbance levels might be considerably greater (>2 times) or less (<0.5 times) than the limit. If a survey with a smaller number of points gives a 90% one-sided-lower confidence limit greater than the disturbance limit, then the block is over. If the disturbance limit is greater than the 90% one-sided-lower-confidence limit and the lower (or upper if the mean is small) confidence interval is $\leq 3\%$ points, then the block is not over.

5. While surveys must be conducted and reported based on entire standards units, cutblock, roadside work area or area of inordinate disturbance as the particular regulatory framework dictates, it is still possible to stratify these survey areas for the purposes of improving the efficiency of the survey, as long as every point in the area being surveyed, has a chance of being surveyed. The techniques for stratifying to improve the efficiency of a survey are described below.

Guidelines for Stratification

Under the Forest Practice Code there was a provision to allow enforcement of soil disturbance limits on areas as small as one hectare. Under FRPA, enforcement of soil disturbance limits is to take place on the NAR of the cutblock. The size of the area on which enforcement can take place is a separate issue from stratifying to improve the efficiency of a survey. A stratified random sample will still report the disturbance level for the entire legal unit that is surveyed, however, not every portion of that unit need be

sampled at the same intensity. The main reason for stratifying to survey is to improve the efficiency of the survey. If, for example, a large portion of the area to be surveyed has very little disturbance (<2%) and a small proportion of the area (<20% of the area) has high disturbance (>15%), then it is more efficient to sample the heavily compacted area more intensely and the less disturbed area less intensely. This saves considerably on the amount of walking that needs to be done and if one stratum is very lightly disturbed (<2%), there may also be an increase in the power of the survey. If you cannot delineate strata with greatly different levels of disturbance, there is no advantage to stratifying. Strata need to be delineated before the survey begins and the most efficient way to do this is from a high resolution image such as those used for the soils FREP process. Such images can be flown specifically for blocks and this possibility should be considered for blocks where legal action is highly likely. The images also allow precise estimates of area in roads, landings, roadside work area, trails or other features in a block. Strata can also be delineated on a sketch map after an on-site inspection.

To stratify, first the amount of disturbance within each stratum is estimated. For example a stratum could be 10 hectares in size and contain approximately 25% disturbance so the amount of disturbance is $10 \text{ ha} \times 0.25 = 2.5 \text{ ha}$. If another stratum is 50 ha in size but contains only 1% disturbance, then the amount of disturbance in this stratum is $50 \text{ ha} \times 0.01 = 0.5 \text{ ha}$. The proportions of disturbance in each stratum are estimates only and do not have to be determined by measurements but no stratum should ever have zero points. The practical lower limit for estimated disturbance in a stratum is probably around 0.5%.

To assign the number of survey points to each stratum the formula is:

$$\text{Points Per Stratum} = \frac{\text{Area Disturbed Per Stratum} \times \text{Total Survey Points}}{\text{Total Area Disturbed}}$$

For our example, to find how many points to put in the 10 ha stratum, the calculation is as follows:

$$\text{Points in 10 ha Stratum} = \frac{2.5 \text{ ha} \times 200 \text{ points}}{2.5 \text{ ha} + 0.5 \text{ ha}} = 167 \text{ points}$$

This leaves 33 points in the big/low disturbance stratum. Surveying will go much more quickly because most of the points are in the small stratum and much closer together. In this case, because the disturbance in the large stratum is so low, there is actually a narrowing of the confidence interval- in other words this survey is more powerful than if the points were randomly and evenly distributed throughout the entire area surveyed.

Roadside Work Areas, Inordinate Disturbance, Areas of Compacted Soil Compacted Areas, Soils That Have Sustained Damage

Roadside work areas, inordinate disturbance and compacted areas are all special survey cases. Roadside work areas have a higher disturbance limit- 25% and so must be tallied

separately from the rest of the NAR. The higher disturbance limit in the roadside work area means that disturbance can be measured with the same confidence with a smaller number of points. Therefore, we recommend using only 100 points in the RWA. Inordinate Disturbance, Areas of Compacted Soil, Soils That Have Sustained Damage and compacted areas are all types of disturbance that may require rehabilitation if they are identified by a block inspection, or during a survey. The provision for rehabilitating these areas are contained in the Forest Practises Code or FRPA and their supporting documents.

Compacted Areas

The Forest Planning and Practises Regulation (under FRPA) requires the rehabilitation of areas of compacted soil:

5) The minister may require an agreement holder to rehabilitate an area of compacted soil if all of the following apply:

(a) the area of compacted soil

(i) was created by activities of the holder,

(ii) is within the net area to be reforested, and

(iii) is a minimum of 1 ha in size;

What constitutes an area of compacted soil under this section of FRPA is not defined but any areas greater than 1ha in size that have more than 25% disturbance, should be documented during the survey for consideration as compacted areas. The potential compacted area should be delineated separately

The provisions for rehabilitating compacted areas and inordinate disturbance are contained in the Forest Practises Code.

47(7) A person who, within an area under a site plan prepared under section 21.1 or silviculture prescription, constructs or modifies a bladed or excavated trail or a corduroyed trail or creates a compacted area, must rehabilitate the area in accordance with the regulations and standards.

In this case, the compacted area refers to an area >100m² and >5m wide that is 100% compacted. For blocks under the CODE or transition CODE, any areas

Inordinate Disturbance

45(3) A person must not carry out a forest practice if he or she knows or should reasonably know that, due to weather conditions or site factors, the carrying out of the forest practice may result, directly or indirectly, in

(a) slumping or sliding of land,

(b) inordinate soil disturbance, or

(c) other significant damage to the environment.

- (4) A person who contravenes subsection (1) or (3) must*
(a) stop the forest practice in the area affected,
(b) prevent any further damage to the environment,
(c) promptly notify the district manager, and
(d) take any remedial measures that the district manager requires

The Timber Harvesting and Silviculture Practices Regulation defines inordinate disturbance as follows:

53 (1) For the purposes of section 45 (3) (b) of the Act, **“inordinate soil disturbance”** means soil disturbance that

- (a) results in the district manager requiring rehabilitation of soil under section 48 (1) of the Act, or
 (b) exceeds the soil disturbance limit specified in section 31 of this regulation.

The Forest Practices Code Act of British Columbia section 48(1) reads as follows:

48. (1) If the district manager determines that the area under an operational plan has sustained damage as a result of a forest practice, the district manager may, by written notice, direct the person responsible for the damage to take measures and to pay costs that are necessary to rehabilitate the area to the satisfaction of the district manager and the person must comply with the notice.

The term “sustained damage” is not defined anywhere but the surveyor should provide data to help make the determination of damage. Any areas greater than 1ha in size that have more than 25% disturbance or any areas in the NAR that are unlikely to sustain tree growth, should be documented in the survey.

Steps for determining confidence intervals and number of points required.

Checking soil hazard ratings

RWA, Inordinate Disturbance, Compacted areas

Regulatory Framework.

Rehab stuff

- , (3) , An agreement holder may rehabilitate an area occupied by permanent access structures in accordance with the results or strategies specified in the forest stewardship plan or by
 - , (a), removing or redistributing woody materials that are exposed on the surface of the area and are concentrating subsurface moisture, as necessary to limit the concentration of subsurface moisture on the area,
 - , (b), de-compacting compacted soils, and
 - , (c), returning displaced surface soils, retrievable side-cast and berm materials.
- , (4) , If an agreement holder rehabilitates an area under subsection (3) (a) and erosion of exposed soil from the area would cause sediment to enter a stream, wetland or lake, or a material adverse effect in relation to one or more of the subjects listed in section 149 (1) of the Act, the agreement holder, unless placing debris or revegetation would not materially reduce the likelihood of erosion, must
 - , (a), place woody debris on the exposed soils, or
 - , (b), revegetate the exposed mineral soils.
- , (5) , The minister may require an agreement holder to rehabilitate an area of compacted soil if all of the following apply:
 - , (a), the area of compacted soil
 - , (i), was created by activities of the holder,
 - , (ii), is within the net area to be reforested, and
 - , (iii), is a minimum of 1 ha in size;
 - , (b), the holder has not exceeded the limits described in subsection (3);
 - , (c), rehabilitation would, in the opinion of the minister,
 - , (i), materially improve the productivity and the hydrologic function of the soil within the area, and
 - , (ii), not create an unacceptable risk of further damage or harm to, or impairment of, forest resource values related to one or more of the subjects listed in section 149 (1) of the Act.
- , (6) , An agreement holder who rehabilitates an area under subsection (4) or (5) must
 - , (a), remove or redistribute woody materials that are exposed on the surface of the area and are concentrating subsurface moisture, to the extent necessary to limit the concentration of subsurface moisture on the area,
 - , (b), de-compact compacted soils, and
 - , (c), return displaced surface soils, retrievable side-cast and berm materials.
- , (7) , If an agreement holder rehabilitates an area under subsection (4) or (5) and erosion of exposed soil from the area would cause sediment to enter a stream, wetland or lake, or a material adverse effect in relation to one or more of the subjects listed in section 149 (1) of the Act, the agreement holder, unless placing debris or revegetation would not materially reduce the likelihood of erosion, must
 - , (a), place woody debris on the exposed soils, or
 - , (b), revegetate the exposed mineral soils.

Calculator for a One Sided 90% Critical Test Value

Enter the number of survey points and the number of counted points below

Number of Survey Points: 80

Counted Points: 54

Mean Counted: 67.5%

Critical Test Value*: 60.7%

Interval Width: 6.8%

t value 1.292



SURVEYOR BLACKBURN & KILCHER		DATE Y M D 2012 10 04		IDENTIFICATION NO.	
LOCATION 476 ROAD A72921 CPO38 RIK 1R		COUNTED DISTURBANCE		TOTAL DISPLACEMENT	

#	CODE	SU	#	CODE	SU	#	CODE	SU
118	-		10	E/A		102	X	WTP
34	-		116	E/A	RWA	114	-	
58	E		8	TS	RWA	49	TS	
51	E	RWA	93	W	RWA	113	-	
62	T ₁₅ /G	✓	86	-		70	E	
12	-		16	E	RWA	41	-	
91	-		27	X	ROAD	111	T ₁₅	
2	TS		9	E	RWA	18	⊖	
107	E/A		96	X	WTP	57	-	
110	E/A	(RWA)	23	-		120	-	
14	E	DESIGN PILE	59	⊖		60	-	
94	E	" RWA	67	T ₁₅		89	-	
80	-		99	-		98	G	
76	E	RWA D-PILE	21	-		88	-	
54	E	"	109	TS		33	-	
7	✓	RWA	63	⊖		32	E	
46	E/A	RWA	20	-		73	-	
39	X	ROAD	81	X	WTP	72	-	
108	E	RWA D-PILE	77	X	WTP	11	L	
65	E/A		19	X	WTP	44	L	
SUBTOTALS						47	E	RWA D-PILE

FS 879 HTH/HSI 94/9

Blackwell, Jason FLNR:EX

From: Wes Bohmer <WBohmer@blndc.ca>
Sent: Friday, January 24, 2014 2:35 PM
To: Blackwell, Jason FLNR:EX
Subject: RE: A72921 Cp008 blk18

Was it road access .guess need maps to see where what before the otbh?

From: Blackwell, Jason FLNR:EX [<mailto:Jason.Blackwell@gov.bc.ca>]
Sent: January-24-14 9:05 AM
To: Wes Bohmer
Subject: RE: A72921 Cp008 blk18

It doesn't appear to be, but I still need to talk with Tahtsa as well.

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

From: Wes Bohmer [<mailto:WBohmer@blndc.ca>]
Sent: Thursday, January 23, 2014 2:50 PM
To: Blackwell, Jason FLNR:EX
Cc: Steidle, Melissa FOR:IN
Subject: RE: A72921 Cp008 blk18

Was this site deg. From dragging or other.

From: Melissa Steidle [<mailto:msteidle@dwbconsulting.ca>]
Sent: January-22-14 3:51 PM
To: Wes Bohmer
Subject: RE: A72921 Cp008 blk18

Hopefully you have a signed contract with TTL.

From: Wes Bohmer [<mailto:WBohmer@blndc.ca>]
Sent: January-22-14 3:49 PM
To: Melissa Steidle
Subject: FW: A72921 Cp008 blk18

From: Blackwell, Jason FLNR:EX [<mailto:Jason.Blackwell@gov.bc.ca>]
Sent: January-22-14 3:44 PM
To: Wes Bohmer
Subject: RE: A72921 Cp008 blk18

Wes

I understand that Tahtsa had logged this block, but unfortunately the legislation holds the "agreement holder" (WFN) accountable, and there is a contract on file that states BLNL will "Manage, administrate, and fulfil all silviculture liabilities related to License A72921", as well as "assume all work required from logging until free growing of License A72921". That is why I sent this to yourself. I'm not sure what kind of contract BLNL had with Tahtsa, but I can only take this case forward against the "agreement holder" as per the Legislation.

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

From: Wes Bohmer [<mailto:WBohmer@blndc.ca>]
Sent: Wednesday, January 22, 2014 3:30 PM
To: Blackwell, Jason FLNR:EX
Subject: RE: A72921 Cp008 blk18

Jason; please send reports to Tahtsa Timber as this is their block and they hold liability and logged it. thanks

From: Blackwell, Jason FLNR:EX [<mailto:Jason.Blackwell@gov.bc.ca>]
Sent: January-22-14 3:16 PM
To: Wes Bohmer
Subject: A72921 Cp008 blk18

Wes

Just for an FYI, The soil disturbance survey that was conducted on this cutblock has been completed, and the results have been compiled. The results have shown that the allowable limits for soil disturbance on the NAR, as well as the RWA have been exceeded by a significant amount, specifically 34.2% disturbance on the NAR, and 67.5% on the RWA. As a result of these findings, we will be proceeding with an OTBH for exceeding soil disturbance limits.

If you have any information that would assist with this investigation, or if you would like to meet to discuss, it would be greatly appreciated. I can also provide you with a copy of the findings if you like.

I am in a meeting for most of the day tomorrow, but would be available Friday, or next week if you want to meet with me.

Thanks.

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

Blackwell, Jason FLNR:EX

From: Wes Bohmer <WBohmer@blndc.ca>
Sent: Wednesday, January 22, 2014 3:49 PM
To: Blackwell, Jason FLNR:EX
Subject: RE: A72921 Cp008 blk18

Ok can sit down and go over sometime.

From: Blackwell, Jason FLNR:EX [mailto:Jason.Blackwell@gov.bc.ca]
Sent: January-22-14 3:44 PM
To: Wes Bohmer
Subject: RE: A72921 Cp008 blk18

Wes

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Subject: RE: A72921 Cp008 blk18

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Sent: January-22-14 3:16 PM
To: Wes Bohmer
Subject: A72921 Cp008 blk18

Wes

Just for an FYI, The soil disturbance survey that was conducted on this cutblock has been completed, and the results have been compiled. The results have shown that the allowable limits for soil disturbance on the NAR, as well as the RWA have been exceeded by a significant amount, specifically 34.2% disturbance on the NAR, and 67.5% on the RWA. As a result of these findings, we will be proceeding with an OTBH for exceeding soil disturbance limits.

If you have any information that would assist with this investigation, or if you would like to meet to discuss, it would be greatly appreciated. I can also provide you with a copy of the findings if you like.

I am in a meeting for most of the day tomorrow, but would be available Friday, or next week if you want to meet with me.

Thanks.

*Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279*

Blackwell, Jason FLNR:EX

From: Melissa Steidle <msteidle@dwbconsulting.ca>
Sent: Wednesday, January 22, 2014 12:20 PM
To: Blackwell, Jason FLNR:EX
Subject: RE: A72921

Hi Jason

Thanks for the heads up. Unfortunately Wes and I had no control over those areas once the contract with TTL was signed. TTL is also taking on the silviculture obligation on those blocks as well. The paperwork is with John Illes. The site deg is also going to come up in the Forest Practices Board Audit as well. Wes flew it with the auditors, he said it was not good.

If a forester prescribed the treatment would have been either Ben or Alistair. I realize I have signing authority over the submission process, but not unfortunately over silviculture treatments which doesn't need a forester at all.

Keep me in the loop.

Melissa Steidle, RPF
Forestry

DWB Consulting Services Ltd.
Office: (250) 562-5541 extension 224
Cell: (250) 567-8972
msteidle@dwbconsulting.ca
www.dwbconsulting.ca

From: Blackwell, Jason FLNR:EX [<mailto:Jason.Blackwell@gov.bc.ca>]
Sent: January-22-14 11:46 AM
To: Melissa Steidle
Subject: RE: A72921

O.K
Thanks Melissa, I will talk with Wes. Just FYI the results of the Survey have been compiled, and this issue will be going forward to OTBH. Even though TTL was the contractor for that specific cutblock, WFN is the License holder, and the Legislation states, "A license holder must...", therefore WFN will be held accountable. The reason I asked if you're looking after this license is that I have a copy of the contract between WFN, and BLNL which states yourself as the RPF signing authority.

If I have any more questions, I'll let you know, and I'll get in touch with Wes Bohmer.

Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations

250-692-2279

From: Melissa Steidle [<mailto:msteidle@dwbcconsulting.ca>]
Sent: Tuesday, January 21, 2014 10:58 AM
To: Blackwell, Jason FLNR:EX
Subject: RE: A72921

Good question. Probably the best person to talk to is Wes Bohmer. TTL is the group responsible for those blocks.

Goodluck and let me know if you need anything.

Melissa Steidle, RPF
Forestry

DWB Consulting Services Ltd.
Office: (250) 562-5541 extension 224
Cell: (250) 567-8972
msteidle@dwbcconsulting.ca
www.dwbcconsulting.ca

From: Blackwell, Jason FLNR:EX [<mailto:Jason.Blackwell@gov.bc.ca>]
Sent: January-17-14 11:42 AM
To: Melissa Steidle
Subject: A72921

Melissa

I was working on a potential soil disturbance case file for license A72921 Cp008. I remember talking about it with you awhile back, but was wondering if you are still the contact for this License?

Jason Blackwell, RFT
Natural Resource Officer
Nadina Field Unit/Skeena Region
Compliance & Enforcement Branch
Ministry of Forests, Lands, & Natural Resource Operations
250-692-2279

Sept 28 Checked ATC921
Cpoos Blk 18 - Block
is approximately 1/2
Completed. Significant
site, clay patch, across
entire geological portion
grouped to extremely
soft + fracturing, with
steaming water patch
across in multiple
locations group the
Block took a very
shorter. Also checked
Block 16, approx. 2 days
of pushing left. Most
of work still need²
to be done, only 1
portion has been

Spilled and sits
down in hay mow.
Well need to be
cautious, ground is
just wet.

Sept 29

[illegible]

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Nov 15 Went to Check on
A-72921 CP008
primary harvesting in
Completed as CP008
Dk. Ho. Wood pile
decided to haul
off of Sp. Ho. Ho.

[REDACTED]

May 15 Went out to check
access for A7192 & cpr
Bk16. The Block is
mostly snow free but
is quite wet, will need
to wait a couple more
weeks before a survey
is completed. Waiting
the remainder of
the block that was
damaged late fall
will wait.

July 31 Look, & flight with
Stephane, Duto the
regional sorts experts
to do a Kene and
look @ some 100
blocks for potential
sites. OTRSH.

Stephen feared that
too. #72921 years / 8
block would be any
on both the 1920s
work area, and on
the black dirt
surrounding would

[REDACTED]

Sept 17 [REDACTED]

[REDACTED]

Oct 4 drove out to
A 72921, cross Bk 18
with Pat Brody
to finish up the
sea clay survey that
was previously started
with Stephane Dubé
the regional soils
expert. Pat and I
surveyed all the
remaining plots on
the Block and sent
the results to
Stephane Dubé for

him to do the
sunnings. all Royal
Weymouth men loaded
into my G.P. when
travelling from plat
to plat, as soon as
the G.P.s Bagged and
messaged come up
"anyway at Weymouth #"
whenever my right
foot was on when the
plat landed. Pat
Brophy who is an
accomplished foot surgeon
recorded all the
results.

[The page contains approximately 20 horizontal blacked-out redaction bars covering the majority of the text.]

Sept 4 left the office with
0900 at 10:00 AM.

72921 0008. Bk
 18, to do the soil
 distance survey for
 the woodland work
 area. All 60 points
 were surveyed and
 the information was
 forwarded on to
 Stephany Duke the
 Regional soils expert
 for completion.

[REDACTED]
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TRIFORM

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