BRITISH COLUMBIA

Ministry of Forests, Lands and Natural Resource Operations

Your Office Name

MEMORANDUM

09 June 2014

RECEIVED
Vanderhoof District
JUN 13 2014
Ministry of Forests, Lands & Natural Resource Operations

To: Allan Johnson, RFT
Compliance and Enforcement Officer
Omineca Region

From: Joseph Kenny, P.Eng, R.P.F.
Engineering Group Leader - North
Engineering Branch,

Re: Spinner Road Instability Issues.

1.0 Introduction

At your request, on August 8th, 2012, you and I conducted an inspection of several road permit roads and associated harvest areas. The road permit roads junction off of the Mountain View Road just past McKale Creek approximately 17km north of McBride BC. Figure #1 shows the approximate location of the sites. Some time prior to our site visit it was reported that three slides/sloughs had occurred along these sections of road and they had travelled through several recently harvested blocks.

The purpose of our inspection was to evaluate the present condition of the three sites and ascertain where possible the underlying causes of the instability. The locations of the 3 sites reviewed are shown on Figure #2

Additionally the Spring Freshet of 2012 in the Upper Fraser River was later than normal occurring and was significantly larger than the average. The June 1st 2012 River Forecast Centres snow pack bulletin, listed the snow pack of the upper Fraser River at 178% of normal. This situation led to significant freshet issues in the Upper Fraser area. No effort was given to determine the significance of this in this report other than a general understanding that 2012 was an above average year for events such as this.

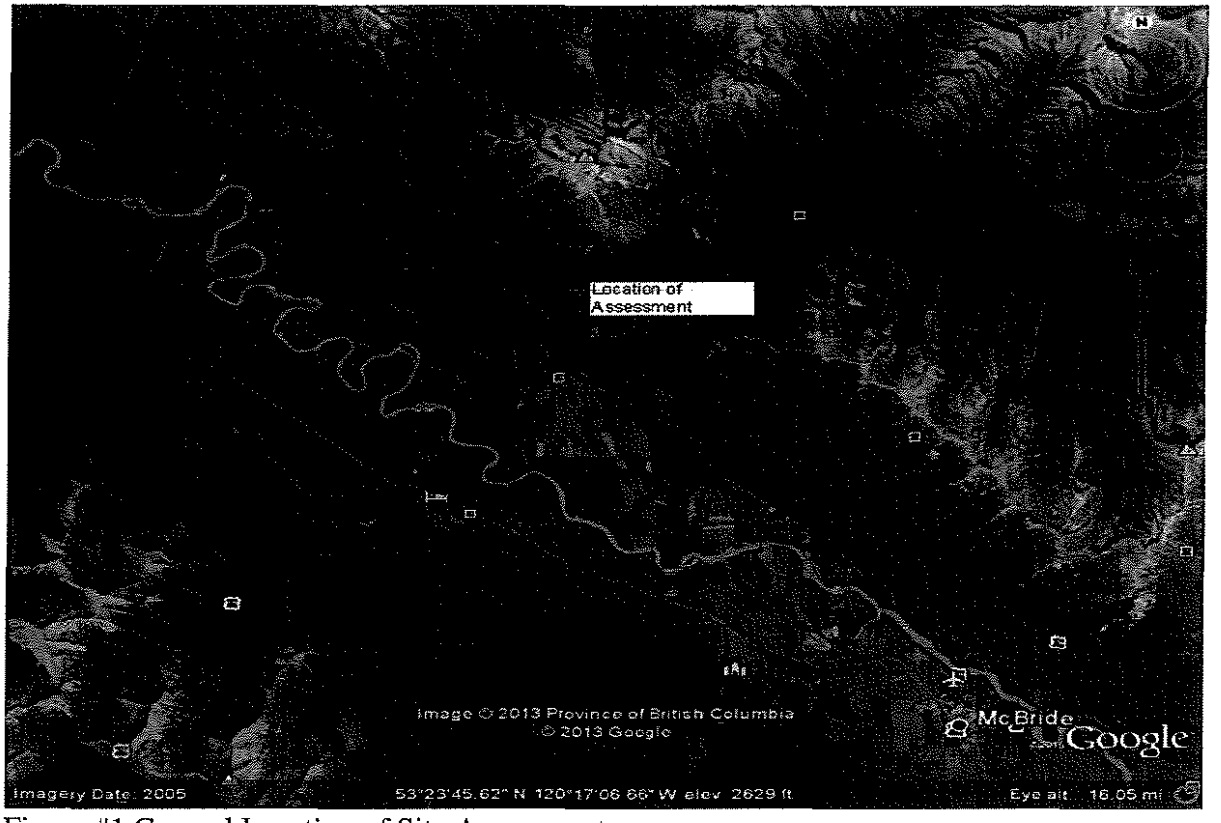


Figure #1 General Location of Site Assesements

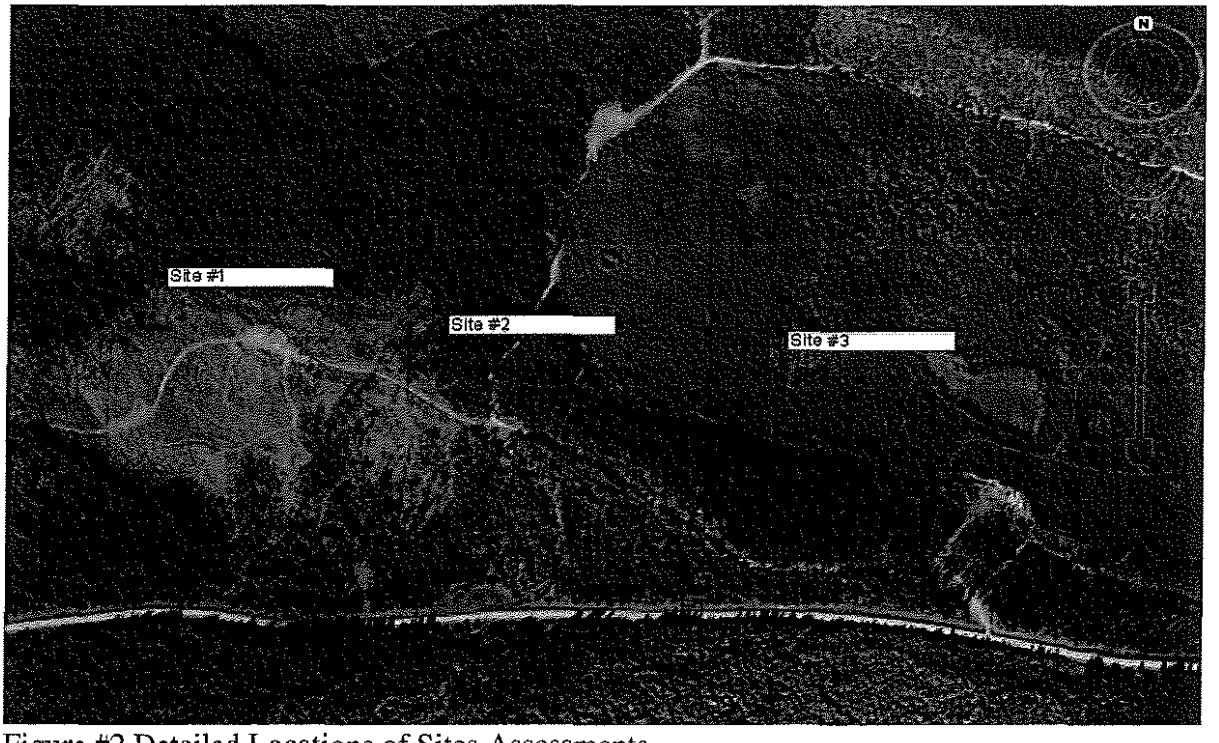


Figure #2 Detailed Locations of Sites Assessments

2.0 Site #1 – Harvested Area

Site #1 consisted of a large failure that appeared to start along the fill slope of a deactivated road permit road. The slide debris travelled down a small ephemeral creek stopping within 100m of Mountain View Road. The surficial soils in the area were variable and ranged from a silt clay to a silty gravelly till and were generally poorly drained. There were also visible layers of gravel and sand where seepage was visible in some locations. The terrain in the area was categorized as a concave draw steepening to approximately 65% at the location of the head scarp. The seepage was visibly present along the base of the head scarp. Photo #1 shows a view of the head scrap from below the upper road and Photo #2 shows a view looking down the slide path into the standing timber.

Photo #1 View of head scarp within block

Photo #2 View of slide path down through standing timber

Upon reviewing the site it was discovered that the failure did not initiate directly off of the deactivated road but rather started approximately 40m down slope of the road. In reviewing the deactivated road above the site it did not appear that the road construction or the deactivation contributed to the failure. The road had been deactivated to reasonable standard and natural drainage in the area had been re-established.

A possible contributing factor to the failure may have been the harvesting of the block and the methods used to harvest, although this cannot be definitively stated based on the information reviewed.

It is not known whether there was a Terrain Stability Assessment (TSA) completed for this block prior to harvesting but given the magnitude of the slide that occurred, terrain in the area, soils types and moisture regime in the area it is felt that this site should have had a TSA completed prior to harvesting. The results of this assessment should have been incorporated into the harvesting plans. Recommendations that would have been expected to be included in the report would have been recommendations for harvesting methods to minimize ground disturbance of the area, season of harvest recommendations, wind firming of boundaries, possibly some retention, and road construction and deactivation prescriptions to maintain natural drainage patterns.

2.1 Site #2 – Road Section

Site #2 consisted of fill and cut slope failures in various states. Photo #3 to # 7 show several views of this road section and the some of the issues. Some repair works had already been done to reopen the road prior to our site inspection. Having no records of how the site was originally constructed and or what the site looked like follow the failure makes it difficult to ascertain what actually had occurred at the site prior to the site repairs but several consistent issues were noted along the length of road section up the hill. The original road appears to be constructed using cut and fill techniques and no end haul or full bench cuts appear to have been done. Cut and fill slopes were over steepened in areas, fills were loosely placed and organics were visible in the grade at several failed section. Additionally it was noted that there was few cross drain culverts and the ditchline was not well maintained.

Given the above noted conditions of the road it appears that the road had several failures both on the cutslopes and fill slope during the early spring of 2012. These failures were due to unsuitable original construction practices for the terrain encountered, lack of ongoing maintenance required to ensure road prism is well drained via the ditch line

Subsequent to the failures the road was reopened. The repairs conducted to reopen the road consisted of pushing slide debris off the road and on to the fill slope and into the surrounding trees and regraveling and grading of the road is sections. Photo #8 shows a typical picture of debris piled up in the trees. The repairs that were done to reopen the road are totally inappropriate for the site and are actual cause ongoing further problems with the stability of the slopes. By pushing loose debris over on the fill slope this is loading weight on the fill slope and decreasing the overall stability of the area.

Appropriate repairs for this section of road should consist of hauling slide debris away from the site and depositing it in a stabile area, pulling back failed cutslopes and rebuilding as required, resloping failed cutslopes and stabilizing as necessary, re-establishing the ditchline and ensuring functional cross drains in appropriate locations. These are just few works that would be required to help stabilize the site. This site should be reviewed by an appropriate professional and a detailed stabilisation plan should be developed. The road in its current state is highly unstable and very susceptible to future stability related issues. In fact between the time the repairs were done and my site visit the slope had continued to fail as witness by the excavator tracks over the top of a recent head scarp shown in Picture # 5.

Photo #3 View cutslope slope failure debris pushed over fill slope

Photo #4 View of fill slope failure – post repair

Photo #5 Cutslope failure post repair

Photo #6 View of failing cutslope and lack of functional ditchline.

Photo #7 Debris pushed off road and piled in trees

Site #3 – Partial Harvest Area

Site #3 consisted of a failure that started mid slope between the upper and lower roads in what appeared to be a selectively harvested area. Photo # 8 and Photo # 9 show a view looking down the failure and view of the head scarp respectively. Photo # 10 shows seepage exiting the slope just above the head scarp. Soils in the area were firm to stiff silts and clays which were poorly drained. It was also observed throughout the slope that may trees exhibited pistol butting which is an indication of marginal slope stability.

It appears the site was cable harvesting selectively along corridors. While this method can and has been used to harvest timber on sensitive sites there are certain precautions that need to be taken to ensure that the slope stability of the site is not compromised. Considerations that would normally be factored into the logging plan are things such as amount of retention,

dominance of retained trees, use of full suspension yarding techniques, corridor location, yarding direction, season of harvest and weather restrictions.

In reviewing the site it appeared that over all a high retention level was maintained but it appeared that the harvesting was concentrated on the removal of the over story dominant fir. In this situation the less stable lower storey was left in place resulting in a residual stand that was not very wind firm and numerous blow down were noted. This blow down caused increase site disturbance. It was also noted that the slope failure that occurred in the yarding corridor was within a natural draw. Although yarding in a draw will make the yarding operation easier, these locations are much more sensitive to site disturbance and are more prone to slope stability problems post logging. This is in large part due to the fact that natural draws will concentrate surface and subsurface flows inherently decreasing slope stability. Photo # 11 shows an adjacent corridor that was harvested where the corridor was not located in a draw and the residual stand is more wind firm, as can be seen in the photo the post harvesting corridor is much more stable.

Although I did not review the logging plan or any Terrain Stability Assessment (TSA) completed for the block and I am not aware if any were conducted prior to harvesting the block, I believe that both of these documents should have been completed prior to the harvesting of the block and should have highlight the hazards associated with this slope as well as noting the inherent risks associated with not taking the adequate precautions for harvesting the slope. The harvesting of this slope and the methods used to harvest it appear to be a large contributing factor of the failure.

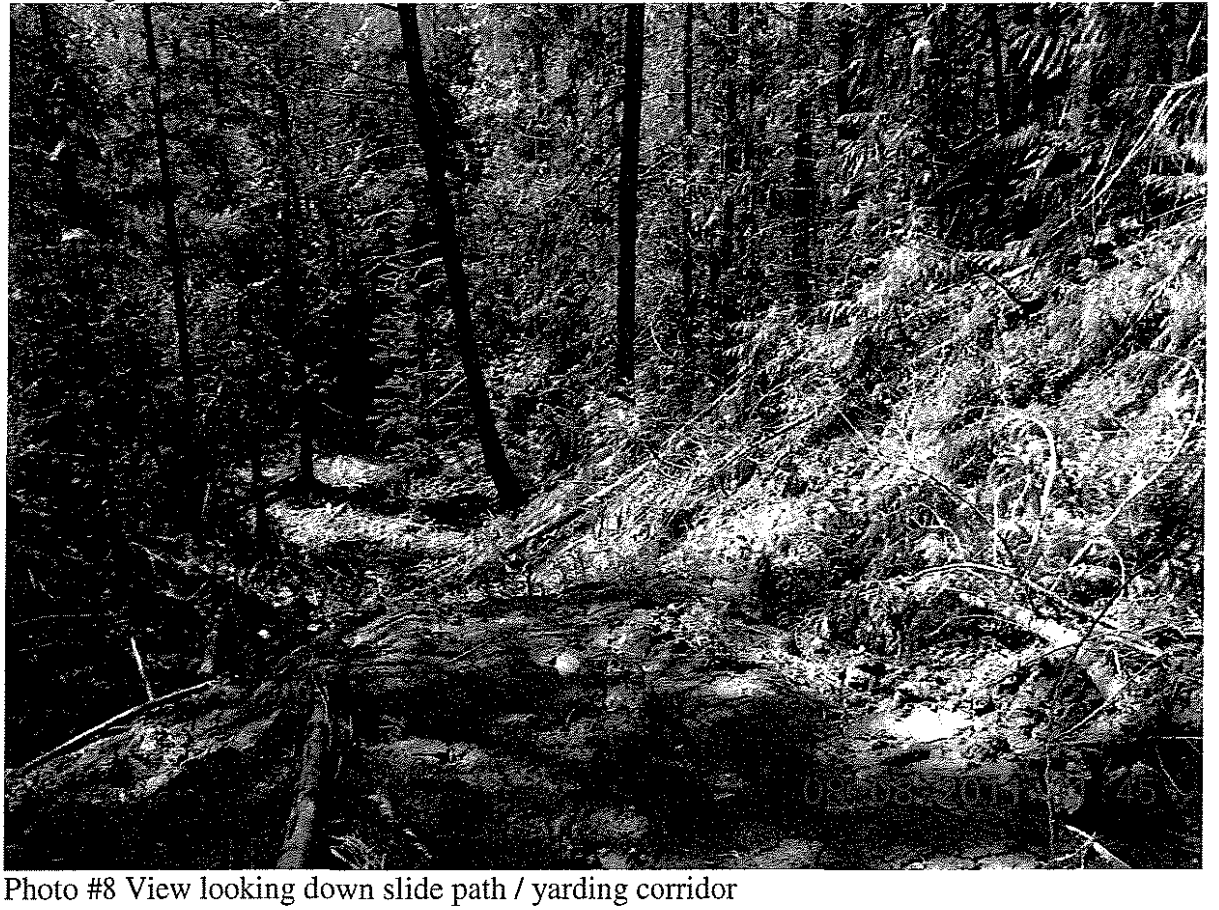


Photo #8 View looking down slide path / yarding corridor

Photo #9 View look at head scarp of failure.

Photo # 10 View seepage above head scarp

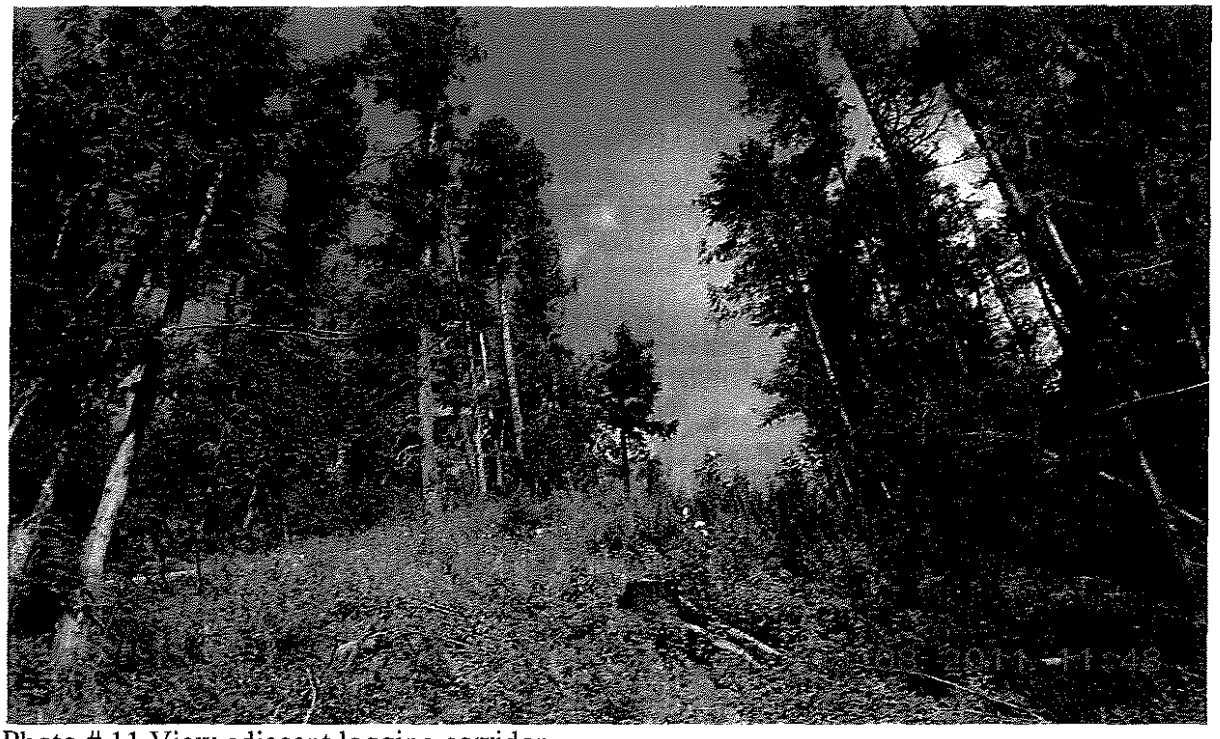
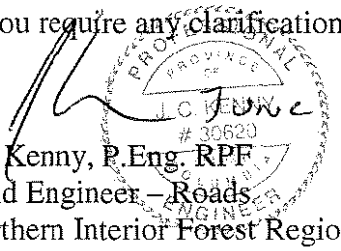


Photo # 11 View adjacent logging corridor

5.0 Conclusion

Three sites were reviewed in the vicinity of Mountain View Road. The first site consisted of a slope failure in a previously harvested block, although harvesting of the timber in the area may have contributed to the failure without additional information it is not possible definitively determine this was the underlying cause of the failure. Site #2 consisted of cut and fill failures along a section of road, these failures are consistent with failures that would be expected from poorly constructed and maintained roads in this type of terrain. Additionally works to open up the road after the failure are actually making the situation even worse and should be inspected by a qualified professional and repair options recommended. Site #3 consisted of a slope failure along a logging corridor in a selectively harvested area. Although no logging plan or TSA was reviewed it is strongly felt that the selection of the corridor and selection of harvest trees contributed to failure of the slope.

If you require any clarification or would like to discuss please call me at (250) 565-4317.



9th/2014

Joe Kenny, P.Eng. RPF
Field Engineer – Roads
Northern Interior Forest Region