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**TO** Steve Sirett  
Deputy Director, Southern Interior Region  
Ministry of Transportation and Infrastructure

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**SITE RECONNAISSANCE TO ASSESS POTENTIAL REINSTATEMENT OF TEMPORARY ROAD**  
20.3 KM SLIDE, QUESNEL HYDRAULIC ROAD, QUESNEL, BC

This technical memorandum has been prepared at the request of Steve Sirett, Deputy Director of the Southern Interior Regional. The purpose of the memorandum is to provide feedback to the Region on the potential to construct a temporary winter roadway across the 20.3 km Quesnel Hydraulic Road landslide located near Quesnel, BC. This assessment is being carried out at the request of the residents in response to comments made by the Ministry during our summer public meeting where it was commented that winter conditions may be suitable to construct a temporary winter road that would be safe for the use intended. This technical memorandum summarizes the findings of the recent site reconnaissance carried out by the Geotechnical Engineering Group.

## 1.0 SITE OBSERVATIONS

Two engineers, Warren Lemky, P.Eng. and Brent Case, P.Eng. from the Ministry of Transportation and Infrastructure (MoTI) Geotechnical Engineering Group carried out a site reconnaissance of the 20.3 km slide site on February 10, 2021 at approximately 1:00 pm. The Geotechnical Engineering Group was accompanied by Ian Grant, Area Manager, Road – South Quesnel.

The temperature on site at the time of the site reconnaissance were approximately -25 degrees Celsius with clear skies and sunny conditions. The temperatures over the previous 3 days had ranged between -25 and -35 degrees Celsius due to an arctic outflow weather system impacting the interior of British Columbia. Evidence of recent snow accumulation over the past week were also evident with accumulations of fresh snow over older hardpack accounting for approximately 300 to 500 mm of total accumulation.

We were only able to conduct limited review of exposed topographic features on site due to the snow cover at the time of the assessment. Efforts to traverse to the higher elevations was not carried out due to safety concerns from deep snow. The site review was only carried out along the roadway to observe ground deformations continuing to impact the road.



While on site, it was observed that the river has partially frozen and river ice is accumulating along the shoreline at the toe of the slope with the centre of the river beginning to ice jam.

Evidence of the continued ongoing seepage and surface water flow exiting the slide mass and flowing over the roadway and down the embankment into the Quesnel River was heard flowing under the snow at the location of Slide B and possibly at Slide E. Reference to slide letters A through G are related to those letters allocated by MoTI during review of this slide over the past 11 months. Refer to Figure 1 for approximate locations of slides.

Field staff boots punched through the snow at Slide B in the vicinity of the previously observed surface water discharge to expose the flowing water observed during our previous site reconnaissance with Golder. See Photos 1 and 2 attached below. No flow was exposed under the snow at Slide E but seepage was assumed base on hearing trickling of water down the embankment. However, it was difficult to differentiate between surface water discharge noise and ice cracking.



Photos 1 & 2: Indication that water is discharging from the formation and flowing under the snow, over the road surface and down the embankment into the Quesnel River even in -25 degrees Celsius.

Observation of the upslope failure at Slide B indicates that the failure is still likely discharging water either from the formation or from surface water, despite the recent very cold weather. Photo 3 indicates where seepage was previously observed and appears to still be melting the snow cover compared to the surrounding snow cover.



Photo 3: Landslide mass above Quesnel Hydraulic Road at Slide B indicating possible surface groundwater or formation seepage discharge from the headscarp

Observation of Slide E/F indicates that ongoing creep failure continues to occur throughout the coldest winter months. A large mass of soil, containing an upright mature cottonwood as well as poplars and shrubbery, appears to continue to raft downslope along a failure plain at depth under the roadway. The rafting soil is creeping at a rate which is likely undetectable by the naked eye and doesn't present itself with cracking of the snow due to the slow yielding and more recent snowfall.

## 2.0 DISCUSSION

Following our observations on site it is our professional opinion that ongoing seepage and discharge across the site as well as observed creeping failure of rafting soil slabs within Slide E/F indicates the groundwater within the landslide mass is still very high and impacting the overall stability of the slide in the vicinity of Quesnel Hydraulic Road near 20.3 km.

The Ministry's comment in the summer that possible road construction may be considered in the fall or winter was based on assumed drying of the geology, thereby lowering the high porewater pressures located within the slopes. The engineering staff do not feel that any suitable lowering of the porewater pressure has occurred within the landslide mass to provide any suitable improvement of the stability.

In addition, due to the very mild and wet fall followed by a relatively mild winter we have had up to the most recent cold weather system, the slopes have not frozen deep enough to provide any stabilization to the ground and provide a basis for constructing a winter road. It is our professional opinion that even if substantial cold weather

had produced suitably frozen ground conditions, the saturated high porewater pressures within the soil from the recent wet summer and fall would only pose a threat to further destabilization of parts or all the slide due to trapping drainage and restricting discharge from the formation, causing hydraulic mounding of the groundwater within the embankment. The hydraulic mounding would set up the embankment for even greater destabilization this spring.

It is our professional opinion that movement of the slide is expected to continue along this section of roadway, especially during periods of warmer wet weather, and are anticipated to increase during freshet. Any modifications we might make to the site to construct a temporary roadway, if possible, would only provide a short duration of access before being impacted by continued failure this spring and during milder temperatures this winter. This would expose the traveling public to unsuitable and unsafe road conditions because predicting when the slopes may become very active in the spring or through warming trends this winter is difficult to anticipate. In addition, construction of a temporary road would still require extensive placement of fill to traverse through the current active landslides. Without any environmental mitigation to safeguard material from discharging into the Quesnel River, either from construction or from continued failure this spring, this may expose the Ministry of Transportation and Infrastructure to environmental agencies such as the Department of Fisheries and Oceans (DFO) that might consider MoTI's actions to construct a road on unstable ground as adversely have impacting the Quesnel River, resulting in fines or penalties.

### **3.0 CLOSURE**

We trust that this memorandum provides sufficient information for your current requirements. Should you have any questions, please do not hesitate to contact us.

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