

Highway 742 – Mount Sparrowhawk Area Hazards

In their reconnaissance of rockslide hazards in Kananaskis Country, Cruden and Eaton (1985) described the following potential hazards in the Mount Sparrowhawk area:

Potential rockslides or rock avalanches from the main peak and sub-peak of Mount Sparrowhawk.

- A potential slide mass in the order of 100 million cubic metres could release from the western face of the main peak and be channeled along the North Sparrowhawk Creek valley and be deposited into the Spray Reservoir. (For comparison, the volume of the 1903 Frank Slide at Turtle Mountain in the Crowsnest Pass was approximately 30 million cubic metres.) Such a slide would overrun the highway and could also create a significant wave in the reservoir that could damage dam structures and facilities downstream.
- A second potential slide mass in the order of 30 million cubic metres could release from the sub-peak of Mount Sparrowhawk and be channeled down Middle Sparrowhawk Creek into the Spray Reservoir.

The potential rockslide and rock avalanche hazard could affect Highway 742 around the following locations:

- North Sparrowhawk Creek (shown as Forbes Creek on some maps, and unlabelled on other maps), at approximately Km 24.
- Middle Sparrowhawk Creek (shown as Sparrowhawk Creek some maps, and unlabelled on other maps), at approximately Km 25.

The risk to the highway from the potential rock slides and rock avalanches from the main peak and sub-peak of Mount Sparrowhawk is judged to be low based on the low probability of such an event. However, such events cannot entirely be ruled out and are not uncommon on a geological time frame during post-glacial time throughout the Front Ranges in the Canadian Rockies and at numerous sites in Kananaskis Country. In any case, due to the potential volume of such rockslides it is not possible to mitigate the risk by stabilizing the potential slide mass or designing/protecting the road such that it would not be affected by such an event. Therefore, short of permanently closing and rerouting the highway there are no options to reduce the risk to the highway at this site. Efforts towards further investigating and characterizing the risk may be of interest under the Alberta Geological Survey's geohazard program and the results of such research may show that a monitoring and possibly early-warning system for the initiation of large-scale slope failures may be possible. However the cost-effectiveness of such efforts is likely low given the low Risk Level to the highway.

The recommended Risk Level to the highway from these potential rock slides, based on AT's general geohazard risk matrix, is as follows:

- Probability Factor of 1, representing an inactive state and a slide occurrence being very improbable.
- Consequence Factor of 10, representing a site where rapid mobilization of a large scale slide is possible.

Therefore, the recommended Risk Level at this site is 10.

Debris flows along South Sparrowhawk Creek

The highway crosses an alluvial fan on the lower section of the creek that has been covered with numerous debris flow deposits. As shown on the attached airphoto figure, the fan and debris flow deposits are not completely revegetated. This suggests that debris flows occur often enough to prevent natural revegetation of these areas. Cruden and Eaton also noted that rockslides further upstream have blocked the South Sparrowhawk Creek drainage in the past, perhaps generating debris flow activity as these natural dams burst. Short duration, high intensity rainfall events similar to the localized storm that was likely a triggering factor for the 1999 Five Mile Creek Debris Flow near Banff, AB (Cullum-Kenyon et al., 2003) could also be a factor at this site.

The debris flow hazard could affect Highway 742 at the crossing of South Sparrowhawk Creek, at approximately Km 26, a short distance southbound of the Spray Lakes Day Use Area turnoff.

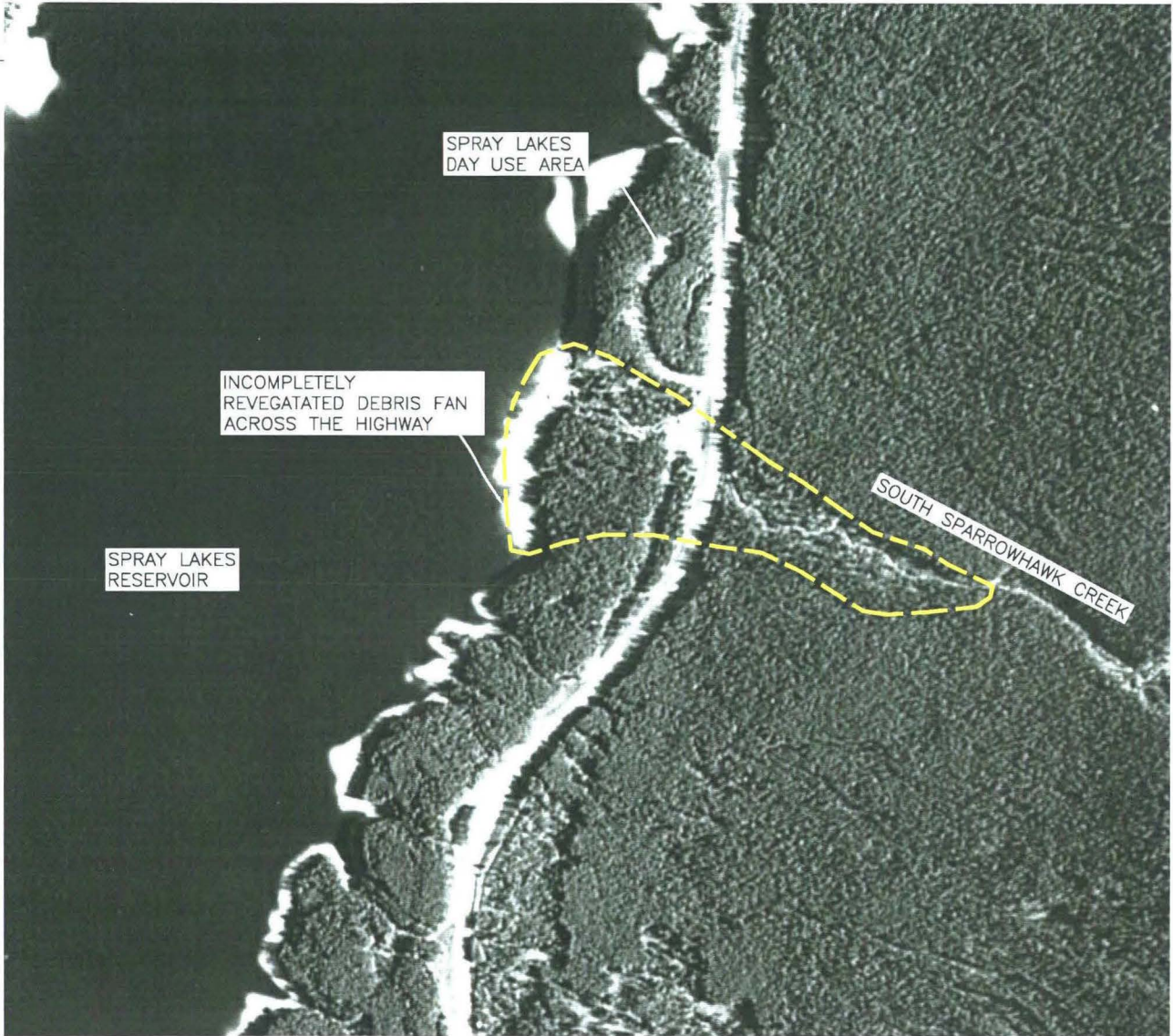
The potential debris flow hazard is judged to be a low risk to the highway, however the risk of a debris flow impacting the highway cannot be entirely ruled out particularly given the possibility of a future rockslide creating a natural dam across the creek channel in the upper reaches of the valley and subsequently bursting. Therefore, the recommended Risk Level for this site, based on AT's debris flow risk matrix, is as follows:

- Probability Factor of 2 to represent such a debris flow being very improbable.
- Consequence Factor of 5 to represent consequences in the order of partial to complete closure of the highway following a debris flow while the maintenance crew uses heavy equipment to clear the roadway and/or remove debris plugging the culvert.

Therefore, the recommended Risk Level relative to a debris flow along South Sparrowhawk Creek is 10.



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TO CANMORE, AB



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TO HIGHWAY 40



amec Earth & Environmental

CLIENT: **Alberta** Transportation

PROJECT:		HWY 742 GEOHAZARDS REVIEW							
TITLE:		SOUTH SPARROWHAWK CREEK DEBRIS FLOW FAN							
DATE:	JANUARY 2009	JOB No.:	CG25262	CAD FILE:	25262Z09.dwg	FIGURE No.:		REV.	A