

**BRIEF FILE REVIEW
(LANDSLIDE RISK ASSESSMENT)**

1)	Site (GP9)	Hwy 40:32 Muskeg River (Junction Lone Teepee Creek)
2)	Reference Location along Highway:	Hwy 40:32 Muskeg River (Junction Lone Teepee Creek) just east of SH 734
3)	Legal Description:	SE Section 15, Twp 57, Rge 5, W6M
4)	UTM Coordinate:	Northing 5978725.525 Easting -239948.507
5)	AI File:	None

6) **Alberta Infrastructure Plan and Profile**

- N/A

7) **General Description of Instability**

Lateral erosion of the riverbank of the Muskeg River incurred scour encroachment of the highway alignment which was constructed parallel to the river for an approximate 100 m long stretch. The progressively eroded river bank occurred along a 40 m stretch and such lateral erosion with time can cause loss of the highway in the event of severe floods in a mountainous environment. The issue is river bank instability involving hydrotechnical engineering in conjunction with geotechnical assessment. Estimated setback of the highway shoulder line from the riverbank was 12 m in June 2000; estimated setback of the highway shoulder line from the riverbank was 14 m in June 1999. Based on this limited data, the annual rate of bank scour is therefore estimated at 2 m per year.

From site observation, fast river flow velocity and large flow volume was apparent at inspections during the Spring of 1999 and of 2000. River flow with approximately 0.5 m water depth across a 15 m wide river bed and creek bank at 1 m height can be estimated. Flow velocity can be at +1 m per sec. The road gradeline is estimated at approximately 2 to 3 m above the creek bed level or at approximately 1 to 2 m above the crest of the creek bank. It appeared that part of the existing bank was constructed with granular fill material and armoured; however, scouring of the creek bank has incurred erosion of the armour material and progressive encroachment of the roadway to as close as 12 m (Spring 2000). From local information, the creek level can rise to flood the roadway during severe flood events. It is apparent that heavy riprap armour and river training design in conjunction with geotechnical assessment is required.

The river training and hydrotechnical engineering will require approval from the Departments of Fish and Oceans and Navigable Waters.

The hydrotechnical engineer (R. Walters, P.Eng.) from Stantec was requested to review the site in August 2000. The preliminary assessment was provided to AI in September 2000.

8) **Date of Initial Observation**

- June 1999 (1999 Slide Tour)

9) **Date of Last Inspection**

- June 2000 (2000 Slide Tour)

10) **Instrument Installed**

- None

11) **Instrument Operational**

- N/A

12) **Risk Assessment**
PF (9) * CF (2) = 18

PF = 9

- River bank erosion at 2 m per year can be possible (1999 to 2000 observation).
- River erosion can be at +2 m year and can over-top the roadway if extreme (1: 100 year or greater) flood event occurs.
- River bank failures are apparently incurring at an increasing rate. This high rate of bank scour movement could potentially endanger the highway.
- High flow volume and velocity from mountain catchment areas result in eroding forces of the river flow.
- Lengthy period to obtain permission from Department of Fisheries and Oceans (DFO) and Federal Navigable Waters to perform in-stream work; this renders the risk of this site at a higher category due to lengthy approval process for any in-stream design and its implementation.

CF = 2

- Closure of the road will be a direct result of erosion of the river bank, however, this will be a long-term possibility (maybe 5 years) because approximately 10 to 12 m setback from the top of bank still available (1999-2000 Estimate).
- Detour can be constructed to the north side as space is available.

Note:

This Risk Assessment rating is based on the Scheme proposed by AI in the Request for Proposal (2000).

Probability Factor (PF) : 1 to 20 scale

Consequence Factor (CF) : 1 to 10 scale

13) **Geotechnical Conditions**

- This site is a low fill embankment located along the bank of the Muskeg River. At this site location the Muskeg River valley is located at an intermont plateau at the foothills region at the eastern flank of the Rocky Mountains. The surficial (overburden) deposits in the general area include glacial till; gravel; and in places, weathered bedrock. The glacial till can comprise of sandy clay and is stoney. It is believed that bedrock is close to streambed and that lateral erosion of the glacial till subgrade was the main concern along the river bank adjacent to the highway.
- The bedrock generally consists of Cretaceous bedrock of the Brazeau Formation of sandstone; shale; conglomerate; minor coal and ash beds.

14) **Chronology**

Historical Setting:

- Existing river bank probably constructed using pit run fill at original construction of roadway to Grande Cache.
- Site inspected in 1999 because maintenance contractor raised concern on increased bank erosion.

15) **Action**

- Stage 1 - proceed with the design of channel stabilization work so that approval can be procured from other authorities (such as DFO and Navigable Waters).
- Stage 2 - proceed with channel stabilization works after obtaining approval of the channel works by the appropriate authorities.

END